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SOME OBSERVATIONS ON THE OPERATION OF ABDOMINAL MYOMECTOMY FOR MYOMATA OF THE UTERUS

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HYSTEROMYOMECTOMY as a method of radical treatment for myomata of the uterus is an operation of recognized value and holds a dignified position among major surgical operations.

For patients over 40 years of age hysteromyomectomy is undoubtedly the operation of choice, and after the age of 45 there will be few exceptions to this choice. Ten per cent of women who require operation for myomata after they have reached the age of 50 years [Bland-Sutton (1)] will have associated with it malignant disease of the uterus. When we consider that four per cent of all myomata requiring operation are associated with some form of malignant disease, the reasonableness of the radical operation in the fifth and sixth decade is evident.

The pathologic incidence of carcinomata of the body of the uterus, and of the cervix when uncomplicated by myomata, is fifteen carcinomata of the cervix to one of the body of the uterus [Winter (2)]. In association with uterine myomata, the proportion of carcinomata of the cervix is not increased, and occurs in but one-third to one-half of one per cent, while carcinomata of the body of the uterus occur in from two to two and one-half per cent, a disproportionate ratio of nearly one hundred to one.

Carcinoma of the gall-bladder occurs four or five times as often in woman as in men, the relation being the same as the relative frequency of gall-stone disease in the two sexes.

Wilson and MacCarty (3) have demonstrated that in seventy-one per cent of over three hundred resections of the stomach for cancer, the disease had its origin in ulcer. We must admit that the chronic irritation of myomata of the uterus stands in the same etiological relationship to cancer of the *corpus uteri* that chronic irritation in other parts of the body stand in relation to carcinomata.

We have no positive knowledge as to the cause of cancer, but the influence of chronic irritation in its production is beyond question. It has been pointed out by Keen (4) and later by Bloodgood (5) that no cases of carcinomata of the skin have been reported which did not begin in some pre-existing lesion, e. g., moles, warts, heat or sun irritation, syphilitic or tuberculous lesions, or the result of chemical or other traumatism, etc. Clinical and pathological observations now point quite clearly to the fact that a malignant condition of the concealed epithelial surfaces of the body also arise in some pre-existing lesion.

Sarcomata occur in association with myomata of the uterus in one and one-half per cent of the cases.

Settled as we are in our conviction that, other things being equal, hysterectomy is the wiser procedure after the patient has reached

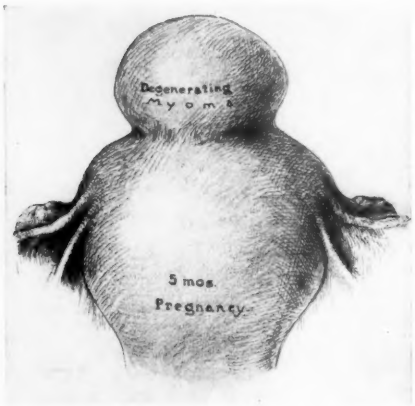

Fig. 1. Degenerating uterine myoma complicating pregnancy at five months.

the age of 40, what shall we do with the not inconsiderable number of patients between the ages of 20 and 30 who are suffering from uterine myomata. To deprive these young women of so important an organ as the uterus in the early years of their life is a serious matter, and I believe that increasing experience will show that it is seldom necessary. Between the ages of 30 and 40 each case must be judged upon its merits, and the wishes of the individual patient should be an important factor in deciding the question of the type of operation.

It is estimated that ten per cent of white women, and 30 per cent of colored women have myomata of the uterus at the age of 50,

Fig. 2. Myoma removed and uterine wound sutured with catgut.

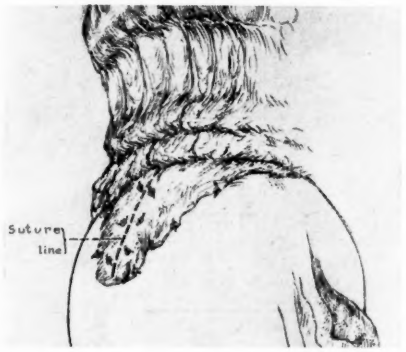

Fig. 3. Edge of the omentum fastened to the sutured uterine wall as a compression pad to check oozing of blood from the suture lines and to prevent harmful adhesions.

but in the large majority the tumors are small and symptomless, and only a limited number give sufficient symptoms to induce the patient to consult a physician, or to require surgical interference.

Noble (6) has demonstrated that in 2,274 operations for uterine myomata and complications, that the pathologic condition showed that in about 30 per cent of the cases death would have followed eventually if the patients had not been operated upon.

Degeneration due to or associated with changes in the nutrition of the tumor, or infection (one or both) is found in eighteen per cent of the operated cases. Fifteen per cent are of the simpler forms, i. e., edema, red degeneration, cystic degeneration, etc. Three per cent suffer from necrosis of the tumor, one of the most serious consequences which can befall a woman with myomata of the uterus. The necrosis often results in general septic peritonitis and death unless promptly operated upon. In these non-malignant forms of degeneration, myomectomy can be resorted to in suitable cases, but in malignant degeneration myomectomy is not to be considered.

It is estimated that about 30 per cent of patients with myomata of the uterus have associated diseases of the ovaries and tubes sufficient to necessitate their removal. This is a somewhat higher percentage than is shown by our experience, and it possibly in-

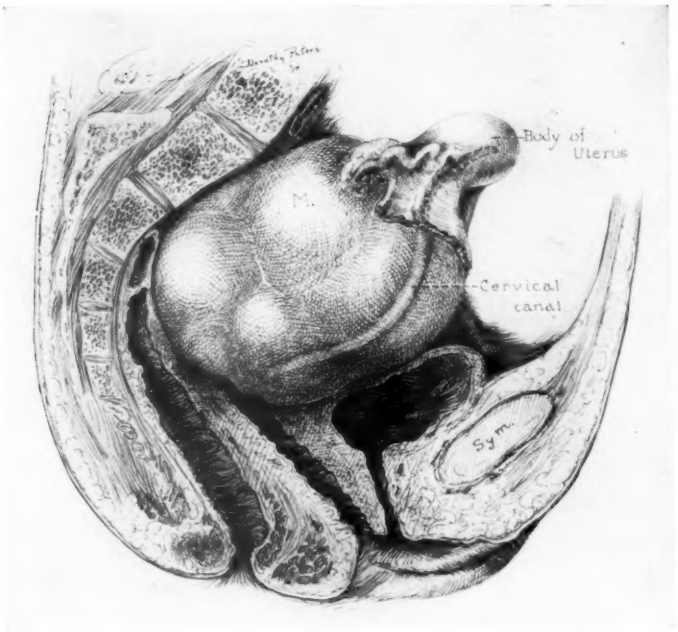

Fig. 4. Myoma originating in the cervix and filling the pelvis, carrying the body of the uterus upward and enlarging the cervical canal to seven inches in length. M, Myoma.

cludes some cases of enlargement of the ovaries due to simple hypertrophy, which, as Clark and Norris (7) point out, is often associated with myomata and does not necessitate removal of the hypertrophied organ. Of course if the ovaries are in a condition to require their removal, myomectomy is contraindicated.

The most serious objection urged against myomectomy is the increased mortality of the operation itself from hæmorrhage, sepsis, and other complications, and yet in 157 unselected and consecutive abdominal myomectomies we have had but one death. Early in our experience some of the patients, following operation, gave us considerable anxiety. Their convalescence was not always uneventful but was sometimes attended with a quick pulse, tympanites, and other evidence of serious constitutional as well as local disturbance.

About ten years ago, A. J. Ochsner was visiting our clinic, and while making a myomectomy I remarked that it was an operation which I feared. Ochsner (8) said very promptly, "You will not fear it if you don't tie your sutures so tight." Referring to the catgut suture I had used in drawing the cavity in the uterine wall together, from which I had removed the myoma, he said: "If you will put in these sutures just tight enough to *coapt* the tissues and stop hæmorrhage and not tight enough to *bleach* the tissues, you will have no trouble." The uterine tissues in the non-pregnant state are firm and unyielding, and disastrous consequences are experienced from tension, which also acts as an invitation to infection. We have followed Dr. Ochsner's advice ever since and I consider his teachings in regard to the danger of suture tension not only in myomectomies but in all operations, one of the many valuable contributions he has made to surgery.

As to hæmorrhage; the use of the continuous catgut suture closing all of the dead space

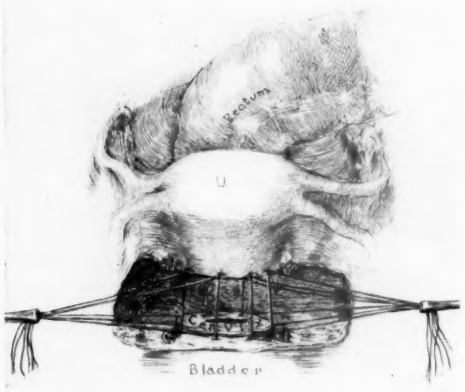

Fig. 5. Myomectomy with resection of the cervical canal. U, Uterus.

as a rule, leaves little to be desired in the way of safety, but the removal of a uterine myoma in the course of pregnancy may be followed by an oozing of blood from the needle punctures, and as a final precaution in such cases we have taken the tip of the omentum and fastened it with fine catgut sutures as a compression pad against the oozing points in the suture line (Figs. 1, 2, 3) thus checking the hæmorrhage and preventing intestinal adhesions. The freely moving omentum follows the contraction of the uterus in the process of labor without interfering with parturition.

Opening the cavity of the uterus during a myomectomy in the non-pregnant state is not a serious matter unless there is infection present, as pointed out by the late Andrew J. McCosh (9). If the endometrium is very thick it can be curetted away most effectively under direct inspection. W. W. Russel (10) shows the advantage of curettement of the uterus under direct suprapubic inspection through an incision in the anterior uterine wall, and we have found this procedure very useful. In this way we have, in several cases, saved a uterus from hysterectomy which was bleeding seriously from a polypus in one horn of the uterus, which could not be, or at least had not been, removed by several curettements. Artificial drainage downward through the cervix should, if possible, be avoided if the endometrium is invaded during myomectomy.

On a few occasions, in operating upon young women, we have removed one entire wall of the uterus and one ovary and tube, the remaining ovary and tube being healthy. We have then fashioned the remainder of the uterine wall into something resembling a uterus, bending it upon itself with such necessary trimming, gores, and pleats as may be necessary to form a uterus with an endometrium. These patients have menstruated regularly and painlessly, and some of them have since married, but so far as we know, they have remained sterile. In one case (a virgin of 22 years) we were able to remove a myoma of the cervix uteri larger than a grape fruit which was impacted in the pelvis and which necessitated the removal of the entire cervical canal from a point just below the internal os to a point slightly above the vagina. With some difficulty we sutured this widely separated fundus to the vaginal remnant of the cervical canal with catgut sutures, and secured a perfect result (Figs. 4, 5, 6). The patient menstruates regularly and without pain.

A possible objection to myomectomy lies in the danger of overlooking some small myomata which later will necessitate a second operation. This occurred twice in our series, one eight years and one six and a half years following the first operation. This is a risk which cannot be eliminated and must be accepted as such by the patient.

Myomectomy during the course of pregnancy is often indicated and in our experience, covering a number of cases, we have had no deaths and only one miscarriage, imminent in this case at the time of operation, which was undertaken with the hope that removal of the degenerating tumor would check the miscarriage. This had been our fortunate experience in several previous cases.

It has been observed generally by the profession that the majority of women with myomata of the uterus undergo pregnancy and often repeated pregnancies with but little difficulty, and it is astonishing to see how tumors impacted in the pelvis are sometimes lifted out spontaneously in the course of pregnancy. The necessity, therefore, of emptying the uterus when myomata com-

Fig. 6. End-to-end anastomosis of the body of the uterus to the stump of the cervix. C, Cervix. U, Uterus.

plicate pregnancy, very rarely occurs, and hysteromyomectomy with the non-viable child must be one of the rarest necessities in surgery, because myomectomy is usually adequate to relieve the patient if acute degenerative changes occur during the course of pregnancy, and elective puerperal hysteromyomectomy (Porro operation) at term in cases where myomata are obstructing the pelvic outlet will, in the majority of instances, save both mother and child.

In a considerable experience in elective Cæsarean section with hysteromyomectomy, we have not lost a mother or a child, if the child was living at the time of operation. Craniotomy and embryotomy not only destroy the child, but often the mother is lost because of hæmorrhage and sepsis. These operations have no place in the treatment of myomata complicating pregnancy, unless under exceptional circumstances.

In going over the cases of uterine myomata which were operated upon in our clinic (C. H. & W. J. Mayo) at St. Mary's Hospital, for the period beginning January 1, 1901, and ending December 31, 1910, some interesting mortality data are furnished which will be briefly summarized herewith.

These statistics include all varieties of operations and the various complications, such as cancer, tubal infections, necrosis and degenerations of the tumor, etc. Every patient dying in the hospital, irrespective of the cause of death or the length of time following operation, is counted as dying from the operation.

Total number of operations for uterine myomata	1244
Deaths	30, or 2.3%
Total number of coincident operations	820
Total number of appendectomies	686
Total number of gall-stone operations	92
Total number of hernias	35
Total number of resections pyloric end of stomach	1
Total number of resections of sigmoid	4
Total number of Meckel's diverticulum	2
	820

Number of cases of myomata of the uterus which necessitated total abdominal hysterectomy, usually because of malignant degeneration or acute infection	66
Deaths	2, or 3%
Number of supravaginal hysterectomies	900
Deaths	23, or 2½ %
Number of abdominal myomectomies	157
Deaths	1, or ⅔ of 1%
Vaginal hysterectomies	77
Deaths	2, or 2¾%
Vaginal myomectomies	50
Deaths	2, or 4%

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INFLAMMATORY TUMORS OF THE ABDOMEN SIMULATING MALIGNANT DISEASE [1]

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HAVING from time to time met with cases in which tumors of the abdomen were assumed to be malignant, and a grave prognosis accordingly given, and in which subsequent microscopic examination proved them to be of inflammatory origin, I thought it would be interesting to report some of these cases, and to call attention to the difficulty of distinguishing clinically between such inflammatory masses and malignant disease.

Inflammatory conditions simulating malignant disease may occur in the sigmoid, rectum, cecum, and colon, and lead to obstructive symptoms calling for operation.

Case 1. Mrs. P., aged 45, sent into the Toronto General Hospital under my care on December 15, 1909, by Dr. Fish.

She had been suffering for the previous six or seven weeks from pain in the abdomen of a colicky character, mostly referred to the left iliac region. This had been so severe at times as to necessitate the administration of morphia. There had been on a few occasions a slight elevation of temperature and increase in pulse rate. She had lost 20 lbs. in weight during the previous three months, and marked constipation had been present.

On vaginal examination a mass could be felt on the left side of the uterus, extending from the uterus and upper part of the vagina to the left pelvic wall. The uterus was pushed over to the right side, and could be moved quite freely anteroposteriorly. The mass was very hard, tender and ill-defined. The right tube and ovary were normal.

Diagnosis. We thought it probably an inflammatory mass, connected with a pus tube, although we could get no history of a vaginal discharge. The hard consistence of the mass and the likelihood of its involving the upper part of the rectum suggested the possibility of a malignant growth.

At the operation the sigmoid flexure was found to be involved in the mass on the left side of the uterus. In fact the sigmoid formed a loop in the pelvis, being adherent below to the vaginal wall and left side of the uterus, and having attached to it in front the Fallopian tube and ovary. With some difficulty the sigmoid was separated from its attachments below, and its wall found to be very greatly thickened, the lumen being reduced to the size of a goose-quill. The mass was two and a half inches in vertical extent, very hard, completely surrounded the gut, and was thought to be malignant. The Fallopian tube was distended with pus, and the ovary also contained an abscess. Both the tube and ovary were removed.

[1] Read before the Academy of Medicine, Toronto, December, 1910.

As her chief symptoms were those of obstruction it was quite clear that — whether the growth was malignant or not — resection of the sigmoid would have to be done in order to give her relief, and this was accordingly proceeded with, four inches of the sigmoid being removed and an end to end anastomosis made. Drainage was provided through the vagina. She made a good recovery, and is at present enjoying good health.

Dr. O. R. Mabee, who made a microscopic section of the mass, reported it to be inflammatory. His report is as follows:

"The thickened portion of the sigmoid is firm in consistence, 6¼ centimeters in length and 5 centimeters in diameter. On transverse section its lumen is almost occluded, measuring only 0.5 centimeters in diameter. The thickened intestinal wall measures 2.25 cm. in thickness. External to the muscular layer is a band of dense firm greyish white tissue, which measures 1.5 centimeters in thickness. Adherent to this is a fairly large amount of adipose tissue, occurring in irregular masses. On one of the surfaces there are several fibrous tags, evidently the remains of fibrous adhesions.

"Microscopical examination was made of transverse sections through the thickened wall. The mucous membrane is thrown up into irregular folds, and is apparently normal. The submucosa contains irregularly scattered foci of small mononuclear lymphocytes closely related to its blood-vessels, and there is a moderate increase in connective tissue throughout. The bundles of circular muscles in some areas are separated by edema, and there are a few areas where there is infiltration by small mononuclear lymphocytes and an increase in connective tissue. The longitudinal muscle shows areas where the muscle bundles have been replaced by dense connective tissue, and there are several foci of infiltration by small mononuclear lymphocytes. Surrounding the muscular layer is a band of dense connective tissue cells in which numerous blood-vessels are present. In some places this dips into the muscular layer, and it shows an occasional collection of small mononuclear lymphocytes."

The condition is one of chronic perisigmoiditis, evidently due to extension of inflammation from the Fallopian tube.

CASE 2. Mrs. G., aged 62. Admitted under my care into St. Michael's Hospital in October, 1900, suffering from chronic obstruction.

On vaginal examination a lump could be felt on the left side of the uterus, and at operation a growth was found involving the lower end of the sigmoid. It was annular and about two and a half inches in vertical extent, and attached to the uterus. About four inches of the bowel were resected, and an end to end anastomosis made.

Cross section, thickened sigmoid. (Case 1.)

At the time of operation the growth was supposed to be malignant, but subsequent section proved it to be inflammatory.

This was evidently a case of chronic interstitial colitis or sigmoiditis.

CASE 3. Mr. W., aged 39. Twelve years ago he had an attack of appendicitis, which confined him to bed for two days. During the previous year he had suffered from flatulence, and occasionally slight colicky pains. Six months ago he had a slight attack of abdominal pain of a colicky character, which kept him in the house for a couple of days, and at that time a considerable mass could be felt in the left hypochondriac region, which was somewhat tender to the touch.

Until recently, however, he had never been troubled with constipation; in fact his bowels had always moved normally, and he had practically never required a purgative. For the previous three weeks he had suffered from colicky pains in the abdomen and chronic constipation. A few days prior to operation he took a large dose of salts, followed in three hours by castor oil, and two or three hours later suffered from severe colicky pains in the abdomen, with vomiting, and only a slight movement. In this last attack his temperature went up to 102° and his pulse to 100, and there was considerable distension of the abdomen, with rigidity over the mass on the left side and some rigidity of the right rectus.

On opening the abdomen in the left linea semilunaris over the lump, the omentum was found rolled up into a large mass, extending across the upper part of the abdomen. It was adherent to the parietal peritoneum in front, and also attached firmly to the descending colon just below the splenic flexure, and continuous with a very large mass involving the colon and surrounding it over an area four inches in vertical extent. It was quite impossible to isolate the colon on account of the adhesions between it and the omentum, the latter

being densely infiltrated and rolled up into a mass a couple of inches in thickness. A few omental adhesions were separated, but not enough to make any appreciable difference in the compression and obstruction of the bowel. The omentum was intensely red and inflamed looking, and although nothing was removed for microscopical section unfortunately, because of the patient's condition, yet it seems reasonably clear that the case was one of colitis and pericolitis, with an enormous inflammatory thickening of the omentum.

The patient made a good recovery, and is now, five months after the operation, almost entirely well and has resumed work, although he still complains at times of gas and slight pain. Of course it is too early yet to be sure that the growth is inflammatory, but one inclines to this opinion for the following reasons:

1. The wide diffusion of the thickening, which involved four inches of the colon and practically the entire omentum, with adhesions between the omentum and anterior wall — lacking the more definite outline of a malignant growth.

2. The fact that the condition has improved with rest, apparently due to absorption, which would not be the case were the growth malignant.

3. The lack of any cachexia and the absence of blood in the stools.

CASE 4. Dr. O. R. Mabee has kindly given me the notes of a case which occurred in the Massachusetts General Hospital while he was in the Pathological department there, and as it is very similar to the last case I think it will be interesting to give it here.

Mr. M., aged 42, was admitted to the hospital on November 2, 1908. Hs stated that he had had one attack of gonorrhœa. During the previous year he had observed a small mass in the left groin, which disappeared on lying down, and three weeks ago disappeared altogether. At this time the lower portion of the abdomen became sore, and subsequently firmer than normal. There was also pain in the left groin and micturition was very painful.

On examination an irregular oval and elastic mass was felt in the lower portion of the abdomen, extending upwards and slightly to the left from the symphysis pubis, its upper extremity being on a level with the umbilicus. It appeared to be adherent to the abdominal wall.

On November 9, 1908, the abdomen was opened, and a large mass was seen, but no attempt at removal was made on account of the bad general condition of the patient. A small section was taken for microscopical examination, and reported chronic inflammation. The patient died two days later.

Autopsy. The omentum was found firmly adherent to the parietal peritoneum covering the left rectus below the umbilicus. It is much swollen and edematous, and contains a large tumor mass, which is deep red in color and which bulges posteriorly and upwards. This compresses the transverse colon, which lies above it, and which is flattened and so compressed as to cause obstruction.

This tumor mass on section is composed of clotted blood, and the colon, which is compressed, shows a small circular perforation having a punched out appearance. Surrounding this perforation is the large thickened and inflamed omentum, which is firmly adherent, hard, and friable.

This case is one of perforated ulcer of the transverse colon, with hæmatoma and inflammation of omentum, and partial obstruction of transverse colon.

CASE 5. Miss S. G., aged 39. Sent into the Toronto General Hospital on November 17, 1900, under my care, by Dr. Burritt.

For the last ten or twelve years she had suffered from attacks of pain in the right hypochondriac region, diagnosed as biliary colic. Being a trained nurse she was seen by a number of doctors, all of whom attributed these attacks to gall-stones. Nausea and vomiting were always associated with them, and she found it necessary to be careful in regard to her diet.

She was engaged in nursing a case of typhoid, and when walking home from her patient's house one day she had a sudden attack of severe pain in the region of the gall-bladder, accompanied by faintness, and with difficulty continued her walk home. She rested there for two or three hours, and then returned in a cab to her patient's house and went on duty. As her stomach had been bothering her for some little time prior to this she had been taking malted milk in small quantities. When Dr. Burritt, who was attending the typhoid patient, found the nurse suffering from pain, he had her leave the case and sent her into the General Hospital.

I saw her the following day, and on examination felt an enlargement about the size of a tangerine orange just below the ninth costal cartilage on the right side. It was slightly movable from side to side and dull on percussion, the dulness being continuous with that of the liver. As she was now free of pain, and thinking that she had an enlarged gall-bladder filled with gall-stones, and as it was Saturday, we decided to defer operation until Monday morning, that is to say, seventy hours after the onset of the severe pain.

On opening the abdomen a mass the size of a tangerine orange was found, involving the anterior

wall of the stomach close to the pylorus, and with a perforation in its center large enough to admit a small lead pencil. There was a slight amount of plastic exudate around the opening, and a little exudate was also found on the parietal peritoneum of the anterior abdominal wall, against which this perforation evidently pressed, which, together with the fact that she had taken such small quantities of malted milk for some days prior to perforation, with the consequent emptiness of the stomach, undoubtedly accounted for the absence of stomach contents in the peritoneal cavity. The mass, which was very hard, was situated midway between the curvatures, and its margin on the pyloric side extended to within one inch of the pylorus. The mass was circular and about two and a half inches in diameter and one and a half inches in thickness. It seemed most probable that the tumor was a carcinoma. However, as the patient was not prepared for so severe an operation as resection of the stomach for carcinoma, and as there was some doubt as to the growth being malignant, it was thought advisable to remove a section for microscopic examination, after which the opening was closed by Lembert sutures.

On section the growth proved to be inflammatory, containing a large amount of fibrous tissue. It was therefore clear that the patient had suffered from gastric ulcer, which had perforated in spite of the enormous thickening which surrounded it.

She made a good recovery, and has since been continuously occupied at nursing. Three years ago I removed her uterus for large fibroids. I spoke with her a few days ago, and she is still nursing and in good health, but suffers considerably from hyperchlorhydria.

CASE 6. Mrs. H., aged 36, complained of pain and swelling below the liver on the right side.

On examination a mass could be felt the size of a tangerine orange, extending from under the ninth costal cartilage and dull on percussion, the dulness being continuous with the liver dulness. It was somewhat tender on pressure, and at times painful. She had lost some weight during the last year and was paler than usual. Although there were no attacks of biliary colic, yet we thought from the situation that it was likely to be an enlarged gall-bladder.

On June 4th, at the Toronto General Hospital, the abdomen was opened in the right linea semilunaris. A mass was then seen the size of a small orange projecting from the right lobe of the liver, immediately to the left of the gall-bladder, and on the surface of this mass were five or six flattened nodules as large as split marbles. There was nothing in the gall-bladder. The mass in the liver resembled carcinoma, but exploration of the abdominal cavity revealed no primary growth. It was therefore thought that the mass was probably syphilitic, and accordingly a small portion was removed for microscopic examination.

After examination of the section the pathologist reported it to be syphilitic. The patient was put on iodide and mercury, and the lump, as well as her symptoms, entirely disappeared in six or eight months' time, and at the end of that period she had put on some weight and was again in good health.

I think these cases show very clearly the difficulty that one frequently meets with in differentiating between malignant and simple disease within the abdomen, even after the abdomen is opened. The frequent complication of cancer by inflammation renders a positive diagnosis extremely difficult and sometimes impossible, but the physiological rest resulting from operation is curative if the condition proves to be a primary inflammation and is not secondary to growth.

I have frequently seen inflammatory masses in the region of the gall-bladder, due to thickening of the omentum and adhesions to the viscera adjacent to the gall-bladder. The appearance and feeling of such a tumor so closely simulates malignant disease as to be frequently mistaken for it.

Mayo Robson (1) reports several cases in which inflammatory tumors were mistaken for malignant ones. One was that of an old man with chronic intestinal obstruction and a hard tumor in the vicinity of the umbilicus. At the operation a tumor was seen to occupy the transverse colon, omentum, and a few coils of the small intestine, and rapid recovery occurred with disappearance of the tumor, after the performance of entero-anastomosis. Another case was in a man of seventy, with obstruction due to a tumor of the ascending colon. An anastomosis was made between the ileum and sigmoid flexure, and the patient was well three years later. A third and even more remarkable case was that of a middle-aged woman, who suffered from chronic obstruction, and in whom a large tumor was found embracing the splenic flexure of the colon and involving a loop of small intestine, both of which were strictured. As the omentum was adherent and the tumor

was nodular and hard it was thought to be malignant, and as its removal was impracticable a double short circuiting was done, colon to colon and small intestine to small intestine. All who saw the case agreed that she would not live three months, yet she recovered, and was in good health a year later.

In 1898 Graser called attention to diverticuli of the sigmoid causing inflammatory pseudoneoplasms.

Neupert (2) reports a case in which there was the development of a chronic suppurative process from perforation of one or more of such diverticuli into the mesosigmoid, with much connective tissue formation and cicatricial contraction of the mesentery. At the operation inoperable carcinoma was diagnosed.

Mummery (3) speaks of lesions of the sigmoid as a cause of colitis. In seven out of thirty-six cases of chronic colitis he found cancer of the sigmoid flexure. Inflammatory conditions of the sigmoid may produce a colitis, and the symptoms are practically identical with those of the colitis due to malignant disease. Bleeding may or may not occur in both cases. In two of his cases of cancer typical mucous casts were passed in the stools. In one case, where symptoms of colitis had been present for five years, there was a malignant growth in the sigmoid.

Schlosser (4) describes four cases of swelling in the abdominal wall after operation for hernia, attributed to silk ligatures.

Wagner (5) reports a case in which a tumor after laparotomy occupied a considerable part of the right abdominal wall, extended into the pelvis, and was adherent to the cecum and omentum. On operation it was believed to be an inoperable sarcoma; microscopically sarcoma or actinomycosis. On dressing the wound a large abscess cavity was discovered, containing part of a metallic instrument used in the original operation.

In three or four cases Hamann (6) has seen inflammatory enlargement of the stump after ligation of portions of the omentum in operations for hernia and appendicitis. Coley (7) and Braun (8) first described the condition, and more recently Leroy (9) has exhaustively considered the question, and Bull (10) reports a case of enlargement of the omental stump resembling malignant growth after hernia.

These inflammatory tumors of the omentum usually appear one to ten weeks after operation, though the interval has in some cases been from four months to three years. They are probably due to infection from ligatures. The swelling may be almost anywhere in the lower abdomen, but is usually near the umbilicus. The tumor has a smooth surface, is firm, sensitive to pressure, and uninfluenced by respiration. If there are no parietal adhesions it is movable laterally and upwards, but not downwards, and there is dulness on percussion, owing to the fact that the intestines are behind it. The order of symptoms is pain and fever, chills, and vomiting, the temperature being dependent upon suppuration. Suppuration may occur, or resolution in the course of several weeks.

I have recently had a case of this sort, which followed an operation for the radical cure of an inguinal hernia by another surgeon. At the operation he resected a large mass of omentum, tying the stump with catgut ligatures. The patient left the hospital two weeks after the operation, and about a week later complained of pain in his abdomen. On examination a smooth rounded tumor could be felt below the umbilicus, which was diagnosed as the lower end of the omentum. This lump at first was about the size of one's fist, but gradually increased in size until ten days later, when I was called to see the patient, there was a mass in the lower abdomen, extending from side to side, and quite eight inches in transverse diameter, slightly movable from side to side, but adherent below. The patient had had chills, and his temperature for the last few evenings had varied from 101½° to 102½° F. His pulse rate, however, did not exceed 90. The mass was very tender to the touch, and I thought I was able to make out, although somewhat indefinitely, deep fluctuation. I advised an incision, which was accordingly made, and about a pint of thick pus was evacuated, containing the colon bacillus. The patient made a good recovery.

Braun (11) reports the case of a woman aged 43, who had a tumor the size of an apple on the left side of the abdomen, leading to a diagnosis of carcinoma of the sigmoid flexure. On removal it was found to consist of fatty tissue infiltrated with connective tissue, with few nuclei and slight perivascular smallcelled infiltration, but there was no sign of malignant growth. Subsequently she developed another similar inflammatory tumor near the site of the former one, which was also removed. She died after the second operation from purulent peritonitis, originating from a small intestinal perforation. He also records two other cases, in which tumors disappeared spontaneously.

Monsarrat (12) reports the case of a man of 44, who had suffered from severe abdominal pain, vomiting, and distension for six months, with obstruction for eight days. On examination a firm and tender mass, movable upwards, was found in the left lower abdomen, and at the operation a tumor the size of an apple was removed from the middle of the sigmoid loop. Microscopical examination showed the stricture to be due to a mass of cicatrix and inflammatory infiltration, with perisigmoiditis and considerable exudation.

Monsarrat reports another case in a man aged 47, who had had constipation for a year, tenesmus for two months, and recently blood in the feces. On examination there was no abdominal distension, but a firm swelling was felt in the left iliac region, not painful on moderate pressure. The passage of a bougie was arrested about four inches up the pelvic colon, and there was hæmorrhage. A diagnosis of malignant disease was made. On operation there was seen to be firm infiltration and induration of the bowel for at least six inches, the entire length of the sigmoid loop being converted into a thin-walled tube, and bound down to the parietal peritoneum of the left iliac fossa by long standing adhesions.

Moynihan (13) reports the case of a man aged 62, with intestinal trouble of seven months' duration, attacks of subacute obstruction during the last three months, and tumor on the left side. A diagnosis of carcinoma was made. On operation a tumor the size of a cocoanut was found in the left extremity of the transverse colon, which was red and thickened, the descending colon and sigmoid flexure pale and empty, and extirpation impossible. An anastomosis was made between the sigmoid flexure and the distal extremity of the ileum, followed by improvement and complete disappearance of the tumor.

Proust (14) gives the case of a woman aged 32, who had a progressive tumor, and in whom laparotomy had previously been performed. The tumor consisted of adherent omentum, the lumen of the colon being constricted by a projecting spur, which on section showed inflammatory thickening and sclerosis. There was no sign of malignancy, and thirteen months later the patient was well.

In these cases of tumors of the sigmoid we probably have two types of inflammation.

1. *Chronic adhesive pericolitis*, following upon an acute perisigmoiditis. In this type there will be a history of the acute stage, with absence of stenosis, hemorrhage, and tenesmus, which will reveal the diagnosis in most cases. Long retention of fecal matter in the sigmoid is probably the primary factor in these cases, the direct result being such damage to the bowel that intestinal bacteria permeate it and set up localized peritonitis. In other cases feces are retained in acquired diverticuli, or hernial protrusions of the mucosa and submucosa.

I have recently had a case of acute diverticulitis, with perforation and the formation of abscess, which, if perforation had not occurred or if the abscess had discharged through the bowel, would undoubtedly have resulted in a large mass, which would have been difficult to distinguish from one due to malignant disease. I am reporting this case in full later.

2. *Infiltrative sigmoiditis*, with no history of an acute attack.

The sigmoid is almost invariably involved in infiltrative colitis of the descending and transverse colon, but the primary seat may also be the ascending colon and cecum. In the milder cases improvement may occur without operation, but the patients may suffer for years.

Graser's diverticuli, which have been previously referred to, may occur in any part of the small and large intestine and are congenital or acquired, the acquired form being most common in the large bowel. They occur mainly in two rows, at the sides of the gut or close to the mesenteric attachment, more rarely on the convexity, the commonest site being the appendices epiploicæ. They may be the size of a hazelnut. When small they are semiglobular, but tend to become flask-shaped as they increase in size and the aperture into the bowel is usually smaller than the maximum diameter of the diverticulum. They are not often found much above the middle of the descending colon, and increase in number and size from above downwards. They are almost invariably full of fecal material.

They may be (1) of congenital origin, or (2) due to pathological causes affecting the intestinal wall. In 80 cases the average age was 60 years, and about 65 per cent are males. They are fairly common in connection with obesity. The normal sacculation of the colon is often exaggerated in constipation, and is sometimes found in association with these diverticuli. The longest retention of fecal material is in this portion of the bowel.

Scheiber suggests muscular weakness or deficiency as the primary cause. Bier the "worked out" muscularis in senility in individuals who have been constipated or obese. The secondary pathological changes are atrophy of muscular fibers and of the mucosal glands, difficulty in expulsion of fecal contents tending to inspissation and concretions, and inflammatory changes in the sac wall due to bacteria.

The direct results are (1) tumor; (2) stenosis from cicatricial contraction and obstruction ; (3) mimicry of carcinoma.

The fundamental pathological characteristic of inflammatory growths simulating neoplasms is that the newly formed tissue is directly continuous with the original seat of the inflammation, and that the proliferating tissue remains under the influence and control of the organism. Tumors on the other hand are autonomous.

In inflammatory conditions definite chronic obstruction is rare, and tenesmus and blood in the stools are seldom absent in malignant disease below the descending colon. If obstruction is absent the symptoms and inflammatory mass will disappear with rest in bed, light diet, and aperients. The result of treatment may thus throw light on the diagnosis.

If when the abdomen is opened there is any doubt as to the nature of the lesion a small piece should be removed for immediate microscopic examination; or if, owing to the extent of the growth, it is impossible to remove it, a small piece should still be removed, so that one may be sure as to the nature of the lesion.

In a case where the diagnosis is doubtful an exploratory laparotomy should be performed even though the prognosis may seem hopeless, as it will remove all doubt, and in some cases the tumor may prove operable. In other cases a palliative operation may relieve urgent symptoms or unexpectedly result in cure.

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INJURIES TO THE KIDNEYS WITH END RESULTS

By PAUL M. PILCHER, A. M., M. D., Brooklyn, New York

INJURIES to the kidney are most frequently the result of a direct force, either a blow, a fall, or a crushing accident. Numerous cases, however, have been seen which were the result of muscular force alone.

Küster in a series of experiments showed that it was by no means easy to cause a laceration of the kidney unless the organ itself were filled with fluid. His experiments consisted of taking a kidney, and after allowing all of the contained fluids to escape, he dropped it from a height to the floor, and no laceration took place. When, however, he injected the blood-vessels, tied them, and filled the pelvis with fluid, a kidney dropped from the same height would be badly lacerated.

As to the mechanism of the laceration within the body, it is believed that usually it is brought about by the kidney being forcibly driven against the vertebral column, or perforated by a rib, or crushed between two solid objects. Gunshot and stab wounds of the kidney are occasionally seen and need no explanation.

All degrees of injury occur, varying from simple contusion and minor lacerations of the parenchyma to complete pulpification of the organ.

It is interesting to note that ruptures of the kidney may take place from muscular effort alone. Watson reports a case in which a woman in reaching up and drawing down the upper sash of a window was seized by a severe pain in the right kidney. She showed signs of severe shock and soon hematuria appeared. The symptoms continued and then was added during the following four weeks the signs of infection of the kidney. The operation of nephrectomy was done and a laceration extending from the cortex nearly to the renal pelvis was found. Numerous other causes have been reported. Kellerman's case, in which a rupture occurred in cases in which the patient was either lifting a heavy weight or suddenly bent forward or backward.

In the first ten years of the service of Dr. Lewis S. Pilcher and Dr. George R. Fowler at the Seney Hospital in Brooklyn, there were twenty-three cases of traumic injury of the abdominal viscera which came to autopsy. In this series there were ten injuries due to railway accidents, five injuries due to persons being run over by wagons, and eight due to falls, kicks, and blows. This series represents only the most serious class of cases, all of whom died within a few hours after admission to the hospital.

In the twenty-three cases there were thirty ruptures of the viscera, of which nine occurred in the liver, five in the kidney, five in the spleen, and seven in the intestine. This shows a percentage of seventeen occurring in the kidney. Four were of the left kidney, one in the right, and two of both organs. In three of the cases there was also a rupture of the spleen, and in one case an extensive rupture of the liver. The autopsy reports by Dr. William N. Belcher showed that in the first case the upper end of the left kidney presented several stellate lacerations, occupying nearly one-half of the entire surface. The right kidney showed hæmorrhage into the pelvis of the organ. In the second case the left kidney was the seat of radiating pulpifying lacerations, the pelvis of the organ being full of blood. The right kidney was likewise the seat of a small laceration at the hilum, the pelvis of the organ full of blood. In the third case the left kidney was ruptured immediately cephalad of the point of exit of the ureter, the right kidney being normal. In the fourth case the left kidney presented three medium sized lacerations on its superior surface, the pelvis of the organ being generally lacerated, the lacerations of the kidney proper, however, being superficial and not extending far into the parenchyma of the organ. The right kidney was normal. In the fifth and last case the left kidney was normal,

while the right organ was entirely surrounded by and imbedded in an extensive area of dark clotted blood, the pelvis containing considerable clotted blood. In all of these lacerations there was but one in which there was marked destruction of the kidney, the remaining cases showing comparatively superficial lacerations, the deepest of these being about a millimeter.

The majority of these ruptures of the abdominal viscera were caused by the application of most pronounced external violence, there being many caused by railway accidents. In one case there was contusion of the kidney without rupture, and in one case a perinephritic hæmorrhage without rupture of the kidney, but with extensive lumbar ecchymosis.

Aside from these cases the following have also come under our care which illustrate still different degrees of injury to the kidney.

COMPLETE LACERATION. OPERATIVE RECOVERY

CASE 1. A man 25 years of age, carpenter, fell from a scaffold and struck on his right side on a projecting piece of board. He was admitted to our service at the German Hospital, Brooklyn, in a state of shock, but there were no external signs of injury on the abdomen or back. The distance he fell was about twenty feet. His only symptom was excruciating pain in the right lumbar region and a rapidly increasing pulse rate. A catheter was passed and showed the presence of large quantities of blood in the bladder. His symptoms of shock and hæmorrhage increased and within two hours an operation was done, exposing the region of the right kidney. The kidney was found surrounded by a hematoma, and as soon as the kidney was disturbed a large clot of blood was liberated from near the pelvis of the kidney, and there was an enormous gush of blood. The vessels were secured, the kidney was removed, and there were found to be two tears, one practically dividing the kidney into two halves, and the second a deep laceration running off at an angle from the first, starting at the edge of the pelvis. The renal vein had been torn. After removal of the kidney the patient made an uneventful recovery.

RUPTURE OF KIDNEY FROM KICK OF HORSE

CASE 2. A boy sixteen years of age was brought to the German Hospital with the statement that he had just been kicked in the flank by a horse. He was in a condition of marked shock, and after his entrance to the hospital the catheter removed bloody urine from his bladder. Within a short time thereafter Dr. Pilcher saw him, at which time he had rallied somewhat from his shock, but there was a fullness, tenderness, and ecchymosis in the region of the kidney. All the conditions pointed to a serious contusion of the kidney.

The usual lumbar incision for exposing the kidney was made. After cutting through the superficial layers and coming down to the perirenal region, an extensive hematoma was revealed and lying loose within the hematoma a fleshy mass, which he identified as the lower portion of the kidney entirely torn off. Upon the removal of the blood clot and sponging out the cavity which had been opened up by the manipulations, an active hæmorrhage was found to be going on from the remnant of the kidney that was still attached. For the control of this bleeding it was evident that the rest of the kidney should be removed, which he proceeded to do at once. The patient made an uncomplicated recovery after the nephrectomy.

PARTIAL LACERATION. INTESTINAL PARESIS. DEATH

CASE 3. W. H., aged 26, was run over by a coal wagon and was admitted to our service in a condition of shock. There was a tenderness over the sternum, the abdomen, and across the lumbar spine. The abdomen was not rigid and there was no evidence of fluid. Urine analysis: Specific gravity 1015, acid, large amount of albumen, few pus cells, and many red blood cells. After admission he had some vomiting; the abdomen was markedly distended and there was no rigidity. The bowels were moved by enema. Highest temperature 100.2°; the pulse improved in force and became less rapid. On the night of the sixth day the abdomen suddenly became distended, and the bowels could not be moved by enema; the patient became delirious. Operation eight days after injury. Median abdominal section. Blood serum in the peritoneal cavity. Intestines greatly distended. A large hematoma over left kidney. No other intra-abdominal injury. Distension of gut relieved by multiple puncture and suture. Abdomen closed. A lumbar incision was made over the left kidney and a large cavity filled with blood with a urinous odor was evacuated and drained. The patient's condition became worse during the operation. The vomiting was not relieved by the operation and he died twelve hours later.

The case presents a certain class in which no laceration of the peritoneum can be demonstrated, but in which intestinal paresis ultimately proves fatal.

LACERATION OF LIVER AND KIDNEYS

CASE 4. A man was admitted to our service with a history of having fallen a distance of about forty feet. He sustained a fracture of the pelvis and there were symptoms of internal hæmorrhage. An operation was done upon him under cocaine, making a median abdominal incision. There was free blood in the abdomen and lacerations of the right kidney and liver were found. Bleeding was controlled by packing with gauze. His general condition of shock was so great that it was decided

to do nothing at the primary operation other than to stop the bleeding. The patient died a few hours after operation.

In this case the associated injuries of other abdominal viscera made complete operation impossible. It was simply a question of stopping the hæmorrhage.

RECOVERY WITHOUT OPERATION. PRIMARY SHOCK

CASE 5. A young man about 30 years of age fell from the roof of a house and sustained a fracture of the pelvis and was admitted to our service in a serious condition. An examination of the bladder showed that there was no laceration of the bladder or urethra. He complained of pain in the region of his right kidney, and it was found that there was blood coming from the right ureter. There was considerable rigidity of the right rectus muscle, and marked tenderness in the right costovertebral angle. It was evident that he had a laceration of the kidney, involving the pelvis, but it was deemed best, on account of the shock, to delay any operation until later. After three hours passed, the pulse was slower and there were no symptoms of progressive hæmorrhage. It was decided to suspend operation until there were active symptoms indicating the necessity for it. Two days following the injury a large area of ecchymosis appeared in the right lumbar region and spread out over the back. The lower ribs were immobilized, and the patient kept quietly at rest upon his back. In four days the urine passed was free from blood and the patient made an uneventful recovery.

We made a definite diagnosis of laceration of the right kidney, but at the time of his admission he was in such a profound state of shock that any operative interference would have proved fatal. The gradual improvement of his condition, together with the diminution of blood in his urine, and the absence of temperature, decided us against operation.

RECURRENT HÆMORRHAGE DUE TO HOT APPLICATIONS

CASE 6. A patient who was struck by the end of a heavy rope in the left lumbar region was seen by Dr. L. W. Pearson three hours after the accident. The patient complained of a severe pain over the left kidney; the urine was negative; hot applications were made over the painful area and later blood appeared in the urine, but cleared the following morning. The pain still persisted and a hot poultice was applied to the side by a neighbor, and two hours afterward the urine contained blood in abundance. The poultice was removed and after two days the urine cleared up again. He was discharged after two weeks, entirely cured.

Treatment. In going over the statistics of the 562 cases collected by Watson,[1] it is found that in the complicated cases almost all of those treated expectantly died, while 66 per cent of those treated by operation recovered. Of all the cases hæmorrhage was given as the cause of death in 80, suppuration in 41, anuria in 34, and shock in 24.

Treated expectantly. Uncomplicated, mortality 29.0 per cent. Complicated, mortality 91.0 per cent.

Treated operatively. Uncomplicated, mortality, 18.3 per cent. Complicated, mortality 44.0 per cent.

It will be seen from the statistics given above that the mortality following injury of the kidneys is alarmingly high, also that the results following operative interference are about 50 per cent better than those in treated expectantly. This includes all classes of cases.

There is reason to think, however, that the operative treatment of uncomplicated cases in the future will show a much lower death rate, provided the operation is undertaken earlier and conducted more thoroughly than has been done in the past.

A number of elements enter into the problem. In the first place, 80 of the 190 deaths occurred from hæmorrhage. That this should occur in so large a number of cases is sufficient proof that the operation was delayed too long. In no case of injury to the kidney or other surgical disease of the kidney has hæmorrhage been the cause of death in our own experience.

It should therefore be an absolute indication for operation. That is: A hæmorrhage from the kidney which persists in considerable amount or is sufficient to produce systemic effects demands operative interference. If hæmorrhage continues even in small amounts for more than two days, or is recurrent, or ceases suddenly, all these factors would call for explorations. If no cause be found on the surface of the kidney giving rise to hæmorrhage, the kidney should be split from pole to pole and the pelvis be explored. The bleeding points may be secured and the kidney sutured with mattress sutures of catgut. It should be remembered that blood does not appear in any amount in the urine unless the laceration extends into the calices or pelvis of the kidney. Therefore, if a perirenal hematoma is found the kidney should be thoroughly explored before reposition of the

[1] Watson and Cunningham: Genito-urinary Diseases, vol. ii, p. 112.

organ. In those cases where a section of the kidney has been torn away, it is not always necessary to remove all of the organ unless the renal vessels have been injured or when the kidney has been extensively injured removal of the entire mass is indicated. Injury of both kidneys would contraindicate nephrectomy. The pressure of free blood in the peritoneal cavity complicating renal injury calls for abdominal section, and it will often be found that there are associated injuries of the peritoneum, mesentery, liver, or spleen.

Death from suppuration following injuries to the kidney occurred in 41 of the 190 fatal cases. Perinephritic abscess and pyelonephritis occurred in the majority of these. In a few purulent peritonitis. Perinephritic abscess calls for incision and drainage, pyelonephritis for nephrectomy, and peritonitis for abdominal section — all such cases in which the kidney tissue itself is infected should not be temporized with, but immediate nephrectomy be done. If the amount of hæmorrhage does not call for early exploratory incision we have no way of providing against infection, but when definite septic symptoms appear active means should be adopted.

Anuria may be due either to reflex nervous disturbances or to blocking of the pelvis and ureter by blood clots. In either case operation may relieve the condition.

CONCLUSIONS

1. The expectant treatment is indicated in cases of slight injury to the kidney in which there is only moderate or transitory hæmorrhage of short duration.
2. Operation is contraindicated where both kidneys are extensively injured.
3. Operation is strongly advised where there is progressive, recurrent or persistent hæmorrhage. Also when infection has taken place.

PRIMARY MULTIPLE MALIGNANCY

With Report of a Case

By CARL B. DAVIS, M. D., Chicago, Illinois

A SINGLE primary growth is usual in malignancy. With the spread of the tumor by continuity and metastases the general conception of malignancy has become so associated with the idea of monocentric origin that multiple centers of malignant overgrowth are frequently overlooked. The literature of tumors is showing a more marked recognition of multicentric origin.

The following case showed two malignant tumors:

A woman, age 60, reported to clinic with a tumor of the skin on the forehead. The growth appeared a few years ago as a pimple the size of a pin head. The original lesion was red and itched at times. There was a gradual growth until the last few months since when the development has been more rapid. At time of operation the tumor was the size of a hen egg. Microscopic examination showed an epithelial tumor of the type described by Krompecher as carcinoma epithaliale adenoides. Several months later patient returned to hospital for pelvic examination, having previously falsely denied any pelvic symptoms as she did not wish to submit to bimanual examination. Curettage showed an adenocarcinoma. Exploratory laparotomy showed an inoperable adenocarcinoma of the uterus involving other pelvic organs.

The tumors in this case show structures in which there can be no question of difference of origin. The significance of this is that we have two malignant tumors originating in epithelium of different types, widely separated and not subject to the same class of external irritation.

According to Walter cancer of the skin is most frequent of all carcinomata, and the malignant growths of the skin of the face are more frequent than those of the remain-

Fig. 1. Location and size of primary Krompecher tumor.

ing epidermis. Because of their superficial position he suggests that they are least liable to escape diagnosis. As they are of long standing as a rule, there would be ample opportunity for other tumors to develop in case there should be any tendency toward malignancy. And this is carried out in the literature, there being numerous cases of cancer of the skin associated with primary malignancy in other organs.

Our case is suggestive of the theory of "system disease" developed by Adami, Beneke, and Hauser, in which the tendency to overgrowth is not confined to a single cell but may extend to an entire organ or system of organs.

This disposition may be due to external conditions of various sorts. Porter and White report multiple carcinomata following chronic X-ray dermatitis; or it may be due to some internal vital influence, as seen in the tendency toward glandular cancer in late life where loss or diminution of function is supplanted by a tendency toward increased proliferation.

Peterson has reconstructed a large number of epitheliomata by means of wax models and has apparently demonstrated multicentric tumors. He suggests these cases as examples of "system disease" of the skin. It seems, however, that if this were the case we should find multiple primary epitheliomata more frequently.

Multiplicity is common in benign new growths, especially those of the skin and uterus. Multiple lipomata and multiple fibromata of the skin are quoted as examples of "system disease." Having multiple benign tumors it seems but a simple step to multiple malignant tumors. This is not true, however, as cases of multiple malignancy are exceptional.

Ribbert has suggested that one reason why multiple primary malignancy is less common than multiple benign new growths, is that the individual with malignant disease does not last long enough for multiple primary manifestation. Possibly the primary tumor has been removed and forgotten and the

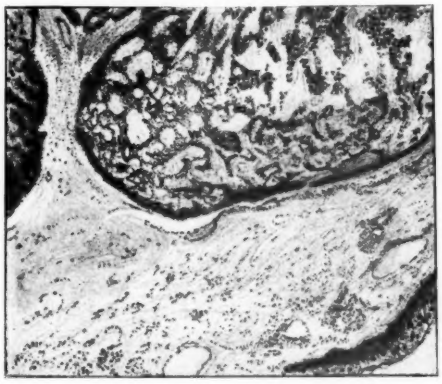

Fig. 2. Low power drawing of tumor of forehead showing arrangement of cells beneath the skin.

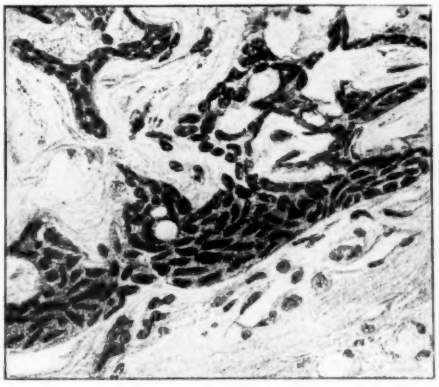

Fig. 3. High power drawing of a field taken from Fig. 2.

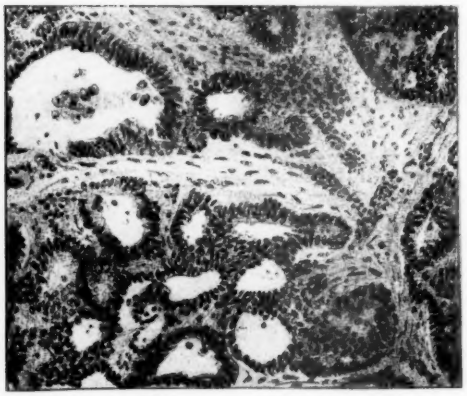

Fig. 4. Adenocarcinoma of uterus and pelvic glands.

secondary metastases have occurred years afterwards. Confusion has arisen following metastases to organs not usually recipient of secondary growths but often showing primary tumors. An example of this was a metastatic carcinoma of the stomach developing in an ovary. The primary tumor may escape notice due to location or lack of development, as a small carcinoma of the thyroid, adrenal, or prostate, may first attract attention by appearance of secondary tumors in various parts of the osseous system.

Multiple primary carcinomata are difficult to differentiate in many cases except where they show different structures. Billroth established three postulates in determining multiplicity:

(*a*) Each cancer must be shown to have a different histological structure.

(*b*) Their origin must be shown to be in different types of epithelium.

(*c*) The primary cancers must have produced their own metastases.

We have cases where sarcoma and carcinoma occur simultaneously in an individual, each tumor being a separate growth. And in a few cases sarcoma and carcinoma are reported in the same organ. Wells and a number of other authors have reported cases in which we apparently must recognize primary carcinoma and sarcoma in the thyroid gland of one individual.

Walter, Ribbert, and Borst report cases of malignant tumors associated with benign new growths. These growths though showing no genetic relationship suggest that the very presence of one tumor may predispose toward a tumor of another type. Benign tumors after a time may show symptoms of malignance; thus any single theory for cancer is not of value in the etiology of tumors in general.

Inoculation would seem to play a rôle in some cases of multiple malignancy. There is reported an epithelioma on the inner surface of one thigh, followed by a similar growth on the other thigh, where the soft parts came in contact. Following removal of malignant growths there are numerous instances of recurrence in the wound in a manner highly suggestive of inoculation. Hubbard reports cases of this kind. This, however, could hardly be applied in those instances where growths are in distant parts of the body and of different types of cells.

The theories of embryonic and postnatal cell rests of Virchow and Cohnheim and the germinal rests of Ribbert might be relied upon in explaining some cases of multiplicity.

Ehrlich indicates the presence of some protective mechanism which prevents abnormal growth, but with removal or decrease of this immunity the tumor rests may begin proliferation.

The parasitic theory in explanation of multiplicity or even of single growths is at present the subject of great discussion.

The chief interest of our case is the fact that we find two primary malignant tumors of different types of epithelium in the same individual. The postulates of Billroth in determining multiple primary malignancy are satisfied in so far that:

(*a*) The tumors arise from different types of epithelium.

(*b*) They have also different histological structures.

(*c*) The uterine tumor had formed metastases which were similar to primary tumor.

As to the significance of this case I am not prepared to speak. Is it an example of system disease? Would the patient have shown other epithelial tumors had she lived

longer? Was there a parasite present which resulted in excessive epithelial growths in two widely separated regions? Possibly it may have been a mere coincidence that these two tumors were present in the same individual.

The author wishes to thank Prof. Bevan for the opportunity of studying and reporting this case.

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LARGE OVARIAN CYSTS[1]

WITH THE REPORT OF A CASE

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LARGE ovarian cysts are rarely met with in these days of modern surgery, as they are usually removed before they attain great size. While the technique of removing them is ordinarily quite simple, ovariotomy will always have an historical interest, because it was the first operation that brought abdominal surgery into good standing. Beginning with Ephraim McDowell, it remained the most conspicuous operation in surgery until the antiseptic methods of Lister became fully established.

The literature on the etiology, pathology, course, and treatment of ovarian cysts is abundant. The large cysts are usually cystadenomas that spring from the remains of Pfluger's tubes or the Wolffian body. Cysts that arise from the Graafian follicles of the ovary do not attain large size. Like other cystadenomas an ovarian cyst is lined with epithelium and as there is no outlet for the products of this epithelium, the cyst gradually increases. Its growth is dependent upon the virility of the lining epithelium and is bound by no other limit. A growing ovarian cyst results in death of the host unless the cyst is removed or destroyed.

In 1900, Dr. James B. Bullitt collected from the literature up to that time (Annals of Surgery, vol. xxxi, p. 87) twenty-five cases of what he termed mammoth ovarian tumors. He included in this list only ovarian tumors weighing 100 pounds or more and reported one weighing 245 pounds that had been operated upon by Dr. A. M. Cartledge, assisted by Dr. Bullitt. The patient succumbed on the seventh day from some form of intestinal obstruction. Of the twenty-five ovarian tumors reported by Bullitt, three were removed postmortem, which leaves twenty-two cases operated upon. Of these, seven died, a mortality of thirty-two per cent. This indicates that removal of large ovarian cysts has a high mortality, due not so much to the difficulty of the operation, as to the fact that these patients have acquired organic lesions from pressure and are poor surgical risks. In addition to this, the large raw surface often left and the removal of pressure from the abdominal viscera may cause adhesions and obstruction, or may interfere with the function of the abdominal organs to a fatal extent.

By the classification of Bullitt the following case could be included in the list of what he terms mammoth ovarian tumors.

A colored woman, L. W., was referred by Dr. A. T. Finch, of Chase City, Va. She was about thirty-three years of age, married, and had three living children, the age of the youngest being seven years. Her family and past history are of no significance. About three years ago she noticed an enlargement in the abdomen, which increased rapidly. She lost flesh and during the day her legs would swell considerably. Her bowels were regular.

[1] Read at a meeting of The Southern Surgical and Gynecological Association at Nashville, Tennessee, December 13, 1910.

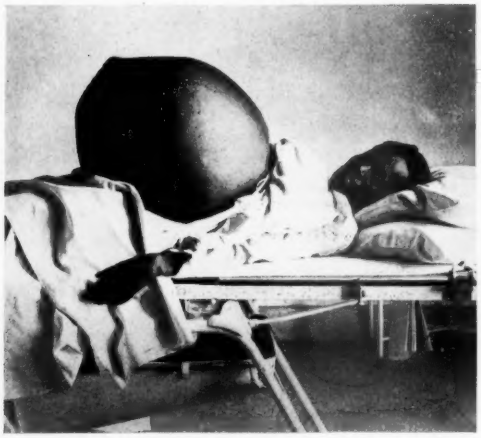

Fig. 1. Photograph of patient with ovarian cyst weighing 116½ pounds. The patient's greatest abdominal circumference was 63 inches. The photograph was taken Sept. 26th, 1910, the day preceding the operation.

Fig. 2. Photograph of patient six days after operation. The extremely relaxed abdominal wall and bulging of the lower part of the chest caused by upward pressure of the cyst are marked.

There was no pain; the patient suffered inconvenience solely from the weight and pressure. She was emaciated in the face and limbs. Her urine was practically normal, but showed a slight trace of albumin. There were no casts. On September 25, 1910, the patient weighed after admission to the hospital, 222 pounds. The greatest abdominal circumference was sixty-three inches. Operation was performed on September 27, 1910. The anæsthetic was ether, which had to be given with the patient lying on her left side and the cyst resting on a table beside the operating table, as she could not breathe well if lying on her back. An incision was made in the median line about six inches in length beginning just below the umbilicus. The abdominal wall was extremely thin. When the peritoneal cavity was reached the cyst was found firmly adherent. It was punctured with a knife and a large quantity of dark, chocolate colored fluid was evacuated. The incision in the cyst was then clamped and the cyst stripped from the anterior parietal peritoneum to which it was firmly adherent from the symphysis to the ribs. There were no adhesions to the viscera. The pedicle was found springing from the right ovary and was ligated with catgut and divided. It was small for the size of the tumor and was flattened out, being about one and one-half inches in width. The sac was removed after division of the pedicle and several gallons of hot saline were poured into the abdominal cavity. The wound was closed in the usual manner. Intravenous infusion of salt solution was started as soon as the operation was begun. The patient left the table in good condition and when returned to bed her temperature was 98°, pulse 84, and respirations 20. About twelve hours later her temperature was 99°, pulse 90, and respirations 26. During convalescence her temperature did not go above 100°, which it reached at noon on October 2d, and her pulse did not exceed 94. She suffered practically no pain and made an uneventful recovery, there being no complication of any kind. The wound healed by first intention throughout. She was kept in the hospital longer than the average case in order that her abdominal wall might regain some of its strength. The cyst weighed 116½ pounds. On October 2, 1910, five days after operation, the patient weighed 105½ pounds.

Dr. A. T. Finch, her family physician, writes me under date of December 2, 1910, that the patient "is doing well and has been at light work for a week and is not suffering at all. The abdomen is getting smaller and she is improving in every way. She weighs now 140 pounds, she eats heartily and does not suffer at all from any pain or trouble."

THE FUNCTIONS OF THE GREAT OMENTUM

A Pathological and Experimental Study

By I. C. RUBIN, M. D., New York City, New York

THE positions, conformations, and relations of the omentum, as found at laparotomies, have given rise to the belief that this organ possesses definite functions. The nature of these functions has, especially in recent years, been the subject of much speculation. From the few simple, mechanical duties which, according to most text-books the omentum performs, numerous views have been advanced in explanation of the feats that this organ has been observed to exhibit.

Heusner summarizes in chronological order the salient views that have been held up to the present. Aristotle regarded the omental apron as a protector to the intestines against cold. Vesalius regarded it as a fixation ligament for the transverse colon. Fabricius called it a sort of "emergency fold" which, by widening when the stomach assumes a more anterior position, enables this organ to accommodate itself to its environment. Cuvier held the same view. Verhagen believed that the omentum protects the abdominal viscera from friction. Valentin Hansen maintained that the omentum serves to draw the filled stomach downward, and thereby facilitates respiration.

In more recent years the omentum has been endowed with additional functions. They may be grouped as follows: 1. As a separating and moistening organ, as well as an absorption organ. 2. As a sort of expanded lymph gland or system of blood-vessels exercising the functions of the general hæmolymph tissues of the abdomen. 3. As a protective and defensive agent in various pathological conditions and accidents. Albrecht even compared its capacity to that of certain forms of leucocytes, which arise only under pathological circumstances.

These latter views have been given birth by extensive observations of the omentum in inflammatory lesions within the peritoneal cavity. For instance, instead of occupying the normal anterior and dependent position, it may be found in any quadrant of the abdomen. This curious fact led observers to ascribe an active motility to the omentum. Milian, Cornil, and Carnot speak of an "intelligent" mobility of the omentum, ascribing to it the spontaneity of movement of an ameba. In fact some authors apply the terms "negative and positive chemotaxis" to explain the apparent attractions and repulsions which the omentum displays toward various types of inflammatory processes.

The following study has been undertaken as an attempt to elucidate some of the problems concerning the functions of the great omentum

ANATOMICAL CONSIDERATIONS

Studies on the cadaver and on the fresh postmortem subject have shown that *without the presence of an intra-abdominal pathological lesion* the position of the omentum is a variable one.

1. *Its length* varies from a few inches to a comparatively enormous length. It may be longer on one side than on the other, and often possesses two or more tongue-like processes. Occasionally appendicular structures hang down from its free edge and along the anterior surface, and have the appearance of appendices epiploica.

2. *Weight and volume.* In emaciated individuals, as a rule, the omentum is found to be very thin, devoid of fat, and sometimes shriveled to a mere shred, along the lower border of the transverse colon. In fat individuals it may attain an enormous size and weight; in one case the omentum weighed one kilogram.

3. *Attachments.* (*a*) The stomach. The attachment of the right border of the omentum to the pylorus varies; in some cases the omentum is attached to the duodenum, in other cases its free edge hangs down from the pylorus. Toward the left, a flap of the gastrocolic omentum lies very commonly over the anterior surface of the stomach, or over the upper part of the spleen without, however, being fixed to either organ by adhesions. (See Fig. 1.)

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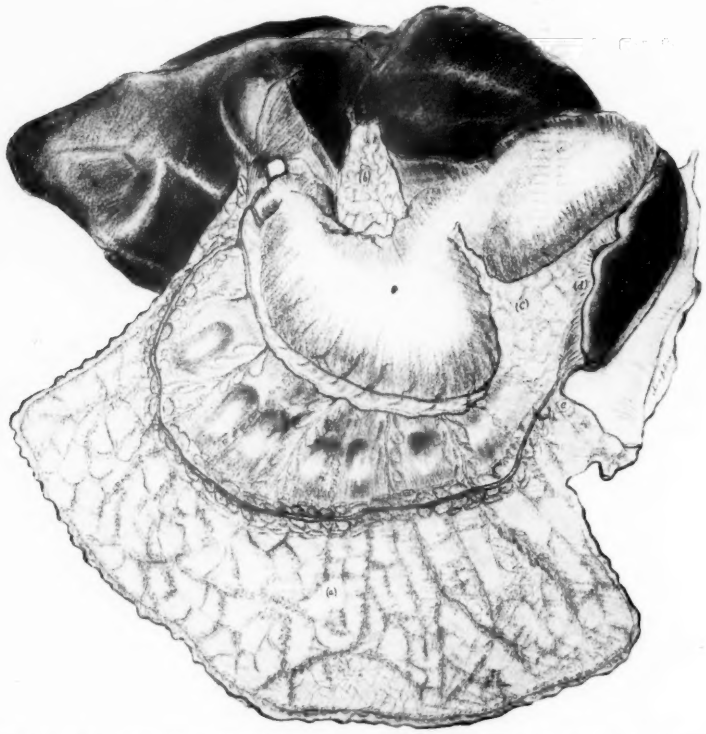

Fig. 1. Autopsy No. 5167, Feb., 1910. Showing attachments of greater omentum (a) to spleen, stomach, transverse colon, parietes, and gall-bladder, in a male individual 20 years of age. b, Lesser omentum. c, A flap of omentum frequently seen, occasionally free, more often attached by adhesions to the stomach or to the spleen. d, Normal lieno-gastric ligament. e, Normal phreno-colic or lieno-phrenic ligament which forms a rest for the spleen. f, Ligament formed by the omentum for the gall-bladder in a certain number of cases. The omentum as it passes up from the pyloric end of the stomach separates into an anterior and a posterior leaf which together embrace the gall-bladder for a varying distance toward the cysticus and ultimately become attached to the liver.

the great majority of instances, fixes this organ to the stomach. A fine membrane from the left border of the omentum is frequently given off to the lower part of the spleen, just below the hilus, and another passes on to the left parietes to form the phrenocolic ligament, upon which the spleen imperfectly rests. This ligament arises invariably from that part of the left border of the omentum which passes over the transverse colon.

(*c*) *The transverse colon.* The hepatic flexure is embraced by the omentum to a varying extent; at times the omentum is almost near the right parietes, while in other instances the hepatic flexure seems much larger because it is uncovered. The gastrocolic part of the omentum is sometimes greater than the free portion.

(*d*) *The gall-bladder.* The right edge of the gastrocolic omentum, particularly when it has extended well over the pylorus, passes up to form a mesentery for the gall-bladder. This ligament may be very broad and may extend from the cystic duct to the anterior portion of the fundus of the gall-bladder. This relationship I have observed in children and infants, where pathological changes are usually out of the question; the mesentery is frequently found in individuals below twenty years of age. (See Fig. 1.) Not infrequently this mesentery was encountered in older individuals, being thin and of the consistency and appearance of the normal omentum. In these instances there was no evidence in or around the gall-bladder of inflammatory trouble.

4. *The position of the omentum as affected by abnormal conditions of the viscera.* (*a*) *The stomach.* When this organ is prolapsed or markedly distended the omentum will naturally extend further toward the pelvis. Manifestly any axial rotation of the stomach will also affect the relations of the omentum.

(*b*) *The transverse colon.* When the transverse colon has a V or U shape, so frequent in old people,

the entire omentum is practically in the pelvis; when the colon is markedly dilated, as in obstruction or meteorism, the omentum is found high up in the abdomen, often rolled around the posterior aspect of the colon.

(*c*) *Intra-abdominal exudates or transudates.* In the presence of ascites, the omentum is invariably found coiled up, and lies adjacent to the lower or upper border of the transverse colon, or against the stomach. In cases in which the abdomen contains very large quantities of fluid, the omentum is found lying on the anterior surface of the liver. In a few instances the omentum floats on the fluid.

PATHOLOGICAL OBSERVATIONS

I give here only the most important observations from my notes on a hundred autopsies made at the Allgemeines Krankenhaus, in Vienna, and in Friedrichshain Hospital, of Berlin.[1] Certain of the autopsies, inasmuch as I had the opportunity to study the clinical facts, served almost the purpose of experiments.

The omentum was found involved in a great many processes, the great majority of which were of an inflammatory nature, which, as a rule, was a fairly gross one. On the other hand, in a certain percentage of these autopsies, in spite of the presence of an intra-abdominal lesion, the omentum was entirely free from adhesions. My findings may be classified as follows:

(1) The *surface of the omentum*, as a rule, was involved in an umbilical hernia, in a laparotomy wound, and in general peritonitis.

(2) In pelvic processes *the edge of the omentum* played the essential rôle in the walling off of inflammatory processes, so common in the female. Where the pelvic organs had succeeded in completely isolating the inflammatory process, the omentum was not involved. Sometimes the omentum was attached deep down in the pelvis and seemed to be the first organ concerned in the adhesion process. When the omentum was involved in an inflammatory process in the pelvis, it formed, as a rule, the roof of the abscess cavity, extending sometimes from one inguinal region to the other; in the latter case the entire edge and a part of the surface were adherent.

[1] I wish to thank Professors Stoerck and Ghon, and Drs. Erdheim and Wiesner, of Vienna, and also Professor Pick, of Berlin, for the privilege of the use of their autopsy material, as well as for their generous co-operation in controlling these observations.

(3) The same conditions were observed in prostatic and periprostatic abscesses, in pericystic inflammations and infected suprapubic cystotomy wounds.

(4) In intestinal rupture, as in perforative appendicitis or perforated gastric ulcer, the omentum was seen, as a rule "plastered" more or less imperfectly to the perforation; the great body of the omentum was divided into folds between neighboring coils of intestine enclosing larger and smaller abscesses; the omentum was partly fixed to the anterior parietes and partly to the lateral wall of the abdomen. When the transverse colon was highly distended or when the amount of exudate in the peritoneum was very large, the omentum was found rolled up against the transverse colon.

(5) In intestinal anastamosis the omentum was, as a rule, attached to the circumference of the suture.

(6) In one case of lymphatic leukemia the omentum was found matted together and occupied the entire internal border of the gigantic spleen.

(7) In two cases of liver abscess the omentum revealed no abnormality.

(8) In lesions of the gall-bladder, the *adjacent portion of the omentum*, as a rule, became attached.

(9) In two cases of fatal intraperitoneal bleeding the omentum was rolled up against the stomach and behaved practically as it would in ascites and intrathoracic lesions.

(10) Retroperitoneal processes and lesions of the gastrointestinal tract not involving the serosa did not affect the omentum. In two cases of typhoid fever and several of colitis, the omentum was normal.

(11) New growths, as a rule, were not attacked by the omentum. If the omentum was found adherent to an intra-abdominal mass, the probability was that the tumor was of an inflammatory character rather than a neoplasm. If the tumor proved to be a true neoplasm an adherent omentum nearly always denotes an inflammatory change. This is a diagnostic sign that, to my view, should prove of help to surgeons. When the tumor, for example, is a dermoid cyst or ovarian cyst which has become twisted and inflamed.

Fig. 2. a, Portions of foreign spleen which was bent on itself and on section seen to be closely encapsulated by; b, adherent omentum; c, dog's own spleen; normal attachments. (Specimen in possession of Prof. L. Pick, Friedrichshain Hospital, Berlin.)

the omentum then may become attached. If inflamed, the omentum is closely adherent. Such adhesions contain no vessels or few vessels. These are sufficient to nourish the cyst wall, but insufficient to provide the interior of a solid tumor as a myoma.

THE QUESTION OF CHEMOTAXIS

Milian spoke of the omentum as having a positive or negative chemotaxis. He attempted to demonstrate this by producing an area of irritation upon a part of the intestine of a guinea pig, but failed to note any response on the part of the omentum. His observations on the cadaver, however, led him to believe that "in certain forms of virulent peritonitis the omentum has actually been repelled from the poisonous process," and lay coiled up along the lower border of the transverse colon. I studied this point in my postmortem examinations, but could not confirm it. In the majority of cases of peritonitis the omentum was found firmly adherent to the anterior parietes or to the intestines. In the smallest proportion of cases the omentum occupied the transverse position. In these cases the amount of exudate was excessive. If the peritonitis is virulent there is sufficient pus formed either to float the omentum (as in ascitis) or to prevent the formation of adhesions. With a change in intra-abdominal tension, it is conceivable that the suction action of the diaphragm might also serve to draw the omentum up toward the chest, as it does the intestines. (In experimental peritonitis the same phenomenon was observed, which see later.)

The term "intelligent chemotaxis of the omentum" is, to our view, therefore not justified by the evidence we possess at present.

EXPERIMENTAL OBSERVATIONS[1]

To throw further light on the question of motility, the following experiments were made: rabbits, cats, and dogs were employed. In the rabbit the omentum is small, in cats and dogs, on the other hand, the omentum is large.

Direct observations. (Rabbits.) (*a*) A rabbit was killed by the anæsthesia; the abdomen of this rabbit was opened in order to inspect the relations of the omentum to the viscera; very active peristalsis was observed. The omentum was then spread over the intestines and was soon seen to move back to its original position. When the large gut or a portion of the intestine which showed sluggish or no peristalsis was placed beneath it, the omentum retained its newly acquired position. A rather energetic peristalsis was required in order to displace the omentum. The intestines rose to various heights and caused the overlying omentum to glide back to its original position.

(*b*) The peritoneum was laid bare by separating the abdominal muscles, but was not opened. Saline solution was then poured over the intact peritoneum. Active peristalsis could be observed through the intact peritoneum. The omentum, however, did not change its position laterally or vertically. When the peritoneum was opened and more saline solution poured in to increase peri-

[1] The majority of these experiments were conducted at the experimental laboratory of Klinik von Rosthorn under Prof. Schottlaender, to whom I am deeply indebted for many useful suggestions.

stalsis, the omentum became displaced, as in the first experiment.

(*c*) To conserve normal peristalsis a cat was placed in a bath of normal saline solution at blood temperature.[1] The peritoneum was exposed by stripping away the underlying muscles. The omentum did not vary its position, though peristalsis was observed through the peritoneum. When the peritoneum was incised the omentum floated out and swam on the surface of the bath.

(*d*) Irritation of the parietal peritoneum by iodine and silver nitrate did not affect peristalsis or the position of the omentum.

(*e*) Direct irritation of the intestines at one point caused local contraction of the gut; the effect, however, was momentary; while the position of the omentum remained unaffected. With the abdomen open the prolapsed omentum was seen to adhere to anything with which it came in contact. The affected portion of the omentum becomes turgid, then succulent, then lusterless and dry, and a fine film of fibrin connects the omentum with the foreign body.

These experiments show that the intestinal peristalsis can change the position of the omentum, and that the latter possesses no demonstrable movement of its own. When intra-abdominal pressure is released, the free portion escapes from the abdominal cavity, as any other movable viscus. Being the most anterior and most freely movable of the abdominal viscera the omentum is the first to emerge from the opened abdomen.

In the cat and dog, the omentum is often seen between and surrounding the coils of intestine, only the free portion escaping from the opened abdomen while the rest remains in situ. When an incision is made above the umbilicus and pressure on the abdominal wall is applied below the incision, the omentum not only does not escape from the abdominal cavity, but it is even very difficult to extract it manually. This is due to the firm fixation between the anterior parietes and intestines by the transverse and vertical lines of fat with which the average omentum is supplied. (Heusner.)

[1] These experiments were carried out under the kind supervision of Prof. Biedl, at the Seropathological Institute, in Vienna.

In man, the omentum may normally extend between coils of gut, and be divided into a number of folds or processes. The peristaltic condition of the intestines and the content of gas account for this formation; the omentum, because of its curtain-like structure, lends itself to the formation of folds and "tongues."

The so-called protective provision of abdominal rigidity is possibly facilitated, if not altogether due to the interposition of the omentum between the contracted muscle and the underlying inflamed intestines. Otherwise it is not easy to understand how the contracted rectus could fix the cecum or any other portion of the gut. With the omentum massed together at the seat of the lesion a more effective immobility or "splint" is effected.

COMPARATIVE STUDIES ON LOWER ANIMALS

These tend to show that the primary functions of the omentum are not defensive in the modern sense of the term, but are purely mechanical. (Heusner.)

These mechanical purposes may be grouped as follows:

1. To afford fixation to the intestines.
2. To provide freedom of movement to the intestines.
3. To serve as carriers for nerves, veins, and arteries.

The great omentum fulfils these objects satisfactorily: for instance, it provides the stomach and spleen with the vessels of nutrition; serves, by one of its processes, to fix the spleen, and acts as an accommodating force upon the motility of the stomach during digestion. This last function is especially evident in herbivorous animals, in whom the enormous size of the stomach (60–80 lbs.) would readily lead to torsion of this organ, were it not for the excessively large omentum which fixes the stomach by its weight and by adhesions to the abdominal wall below. The habits and stage of evolution of the animals determine to a certain extent the development of the omentum; the omentum, for instance, is absent in the fish. The first indication of an omentum is seen in the lowest form of vertebrates, the giant salamander.

(Klaatsch.) To Heusner this represents a higher stage of evolution. Birds have a very primitive omentum. According to Breman, a chicken embryo of 154 hours shows an indication of one, but it remains primitive. The thick gizzard becomes adherent to the anterior abdominal wall; this adhesion later becomes thinned out and forms a fine net-like attachment which divides the abdominal cavity into an upper and lower compartment. Dogs, cats, and domestic carnivorous animals have a remarkable development of the omentum. In female dogs the omentum does not reach as far toward the pelvis as in male dogs, but the lower portion of the abdomen is compensated by the broad and extensive mesentery of either horn of the uterus. This ligament extends on either side as high as the kidney. The omentum in monkeys shows the nearest approach to that of man. In certain monkeys of the New World, the omentum is attached to the transverse colon.

The development of the omentum is bound up with that of the stomach and spleen. Experiments on the omentum with a view of determining its behavior in the presence of intraperitoneal lesions, have taken advantage of the difference in the degree of development in the various species and classes of animals. The spleen is an organ that is readily accessible in lower animals, and is apparently not vital to the organism.

De Renzi and Boeri (in 1903) performed the following experiments:

1. The main branches of the splenic veins were ligated, as well as the gastrolienal vein and artery. The spleen, as far as size, color, and consistency were concerned, retained its integrity at the end of two and one-half months. They conclude therefore "that the omentum provides in part at least for the sustenance of the spleen. The omentum becomes adherent to the spleen. This adhesion is rich in blood-vessels and on separating the spleen and omentum the adhesions bleed freely. This power of the omentum to restore an impoverished circulation has suggested to surgeons the feasibility of supplying a new source of blood supply in conditions in which the portal circulation is diminished."

2. Ligation of all the splenic vessels in the dog. After ten days the spleen was found surrounded by a thick omental capsule. After twenty days the spleen was as large as a walnut and was two or three cm. in thickness. At the end of two and a half months no trace of spleen was left, only a fine fibrous nodule, the size of a hazelnut.

3. (*a*) *Ligation of splenic vessels* together *with ligation of blood-vessels of omentum* led to death of the animal within 24 to 48 hours, from gangrene of the spleen; no capsule is found.

(*b*) Removal of omentum; after ten days ligation of splenic vessels; death in three to ten days. The cause of death they ascribe, not to the operation (as animals recover after single procedures) but rather to "auto-digestion of organ" and the "consequent setting free of poisonous nucleiprotein substances, which according to Salkowsky, 1888, Schwiering, 1894, and Muller, 1902, are found in dead tissue. As long as the blood circulates the tissues can overcome auto-digestion; not only by the new blood supply furnished by the omentum but also by the formation of a capsule which enables the organ to maintain its vitality."

Pirone, not satisfied with this explanation, controlled these experiments in the following manner:

Ligature of splenic vessels. At the end of five, twelve, fifteen, and twenty-one days, the animals were killed by chloroform. At the end of the first few days the omentum surrounded the spleen, a white fibrinous exudate forming between the spleen and the omentum. At the end of the first week a capsule is formed by the omentum, lumps of fat are visible on its surface; the omentum appears thick and opaque. At the end of two weeks the spleen is destroyed to a greater or lesser extent, and is surrounded by a very fine capsule. In rabbits, at the end of the third week the spleen has almost entirely disappeared. The peritoneum and other organs are not at all affected. His histological examination showed: A marked emigration of leucocytes, mostly polynuclear; these are collected in the connective tissue trabeculæ of the omentum, and fill the space

between the omentum and the spleen. Some leucocytes also penetrate the capsule of the spleen. There is a marked increase of the connective tissue cells, also of the cells of the trabeculæ and the endothelial cells of the surface. Furthermore there is a formation of new blood-vessels in the omental capsule; these penetrate into the spleen through the capsule and are accompanied by the newly formed connective tissue. The endothelial cells show the following changes: they are prominent; the nuclei are larger and richer in chromatin; the protoplasm is increased; there are numerous mitoses. They have become transformed into phagocytes. Within the spleen these cells appear like giant cells. In occasional cells the protoplasm is filled with nuclear granules, red blood cells, or nuclei of other cells. When the spleen has completely disappeared, *there remains only a mass of scar tissue within the encapsulated omentum*, or if suppuration has occurred, the abscess is surrounded by the omentum.

Pirone concludes that "The omentum has a *protective* function. This is shown, *first:* by the formation of blood-vessels contained in the connective tissue capsule; and *second*, by the *phagocytic* efficiency of its transformed endothelial cells and of the emigrated leucocytes."

In another series of experiments, Pirone ligated and extirpated the spleen. The animals were killed at the end of twenty, thirty, and sixty days. In some cases the omentum showed a pus focus at the site of ligature; in all instances the omentum was fixed to the cicatrix of the peritoneal wound. The remaining peritoneum, intestines, and other abdominal organs were always normal. In other words, he believes his experiments confirm those of De Renzi and Boeri, and that besides an "intelligent motility" as Cornil calls it, the omentum, under certain conditions, possesses a true defensive function.

Schieffendecker, quoting Lewis' observations on hemolymph glands in which the endothelial cells become transformed into phagocytes, concludes that phagocytic cell changes can take place from the endothelium of the omentum. Whether this is true of the omentum is questionable. Von Recklinghausen, Bizzozero, Golgi, Muscatello, and others, have shown the similarity in the structure of the omentum to that of the lymph system. On the basis of this analogy Schieffendecker argues against Heusner's statement "that there exists no special organ for pathological conditions."

From the fact that the spleen in the rabbit, cat, and dog is an intraomental organ receiving its blood supply by blood-vessels that are carried in the substance of the omentum, it seemed to me that ligation of the splenic vessels could not be readily accomplished without at the same time injuring the omentum, and thereby vitiating the purpose of the experiment. For instance, experiment 1 of De Renzi and Boeri cannot be regarded as valid because the blood supply is maintained by the untied splenic omental vessels; the spleen would not suffer because "the main splenic vessels" were tied off; enough blood circulates to the spleen from the remaining vessels which the omentum *normally* carries to the spleen. It is only in this sense that the omentum can be said to "restore the circulation" of a contiguous organ. It manifestly cannot serve this purpose for any other organ because of the lack of a similar intimate vascular connection. (See later, gall-bladder, kidney, etc., also reference to Talma's operation.)

THE EXPERIMENTS OF DE RENZI AND BOERI, AND OF PIRONE CONTROLLED

Instead of ligating isolated vessels I ligated the entire omentalsplenic ligament, in cats, dogs, and rabbits. The same results were seen as those obtained by De Renzi and Boeri. The animals survived, apparently unharmed. The spleen became encapsulated as in experiment 2 of De Renzi and Boeri, in which total ligation of the splenic vessels alone was made. To still further test the so-called protective rôle of the omentum, particularly in its relation to the spleen, I resorted to two series of experiments:

1. *The greater part of the omentum was resected.* Where this was done, the spleen was found after a certain length of time (8 to 14 days) to be much smaller, showing evi-

dently that the blood supply had been diminished.

2. *Resection of the omentum completely, and reposition of the resected spleen within the abdomen.* Where this was done the spleen did not become encapsulated. According to De Renzi and Boeri, death of the animal should have occurred from "auto-digestion." In fact the animals survived for weeks and in some instances months. Subsequent laparotomy showed the spleen markedly diminished in size. The spleen was usually found fixed to the abdominal wound, between the intestines and the abdominal incision; the cecum being the part of the intestine most commonly adherent. In some cases the spleen was found in the pelvis, fixed by the bladder. In one experiment (a dog) the spleen was adherent to the mesouterus. In another experiment (rabbit) the spleen was found, after four weeks, reduced to about one-tenth its original size, and fixed to the posterior parietes by the large heavy intestine. There were no adhesions; the spleen was normal in color but covered by a fine film.

3. In still another series of experiments upon rabbits *the spleen alone was resected and replaced in the abdomen as low down as possible.* In the great majority, the spleen was found encapsulated by some portion of the omentum. In two animals, where only partial resection was done, the intact portion of the spleen was encapsulated by the contiguous portion of the omentum, while the free portion was found encapsulated by another area of the omentum. *Both portions of the spleen had undergone the same amount of destruction.* If the spleen escapes fixation in one of the ways described above, it sooner or later becomes attached to the intact omentum.

In order to note the behavior of the omentum toward a foreign spleen, two dogs were operated on simultaneously; the spleen of the one was placed in the abdomen of the other. Two weeks later the abdomen of the dog containing the foreign spleen was examined. The greater portion of the omentum was seen rolled up into a rather large, firm, solid mass. The spleen was nowhere visible in the abdomen. On sectioning the omental mass, it became evident that the spleen had been completely surrounded by omentum. The spleen was doubled up, reduced to about two-thirds its original size, and was closely encapsulated by omentum. This, on section, formed a white, glistening, more or less homogenous capsule. The central portion of the spleen was pultaceous, and on microscopical examination showed various stages of necrosis, which was less marked toward the periphery. Only a narrow zone of normal looking spleen tissue immediately underlying the omental capsule remained. (Fig. 2.)

When any other viscus than the spleen was deprived of its blood supply, the omentum became attached to it with the same relative frequency. Thus, the ligation of the pedicle of the gall-bladder, whether stripped from the liver or left in its normal relations, caused the nearest portion of the omentum to become adherent to it. When the gall-bladder was normally concealed between the lobules of the liver, or when the liver and gall-bladder both became adherent to the abdominal incision, no adhesions developed between the ligated gall-bladder and the omentum. In two cats the gall-bladder was resected and dropped back into the abdomen. After a few days it was found surrounded by a portion of the omentum.

After ligating the pedicle, the kidney was found several days later surrounded more or less completely by the omentum. In the rabbit only the upper half of the kidney was the seat of the omental attachment. In both cats and rabbits the kidney was found the seat of a hydronephrosis, and enlarged to about twice its normal size. (Here again the omentum failed to restore the circulation to the kidney or to maintain its integrity.)

Ligation of the mesoappendix and of the base of the appendix produced adhesions with the omentum in only one out of three experiments. Simple ligation with silk of the body of the urinary bladder in rabbits and cats gave negative results, so far as the omentum is concerned.

POWER OF THE OMENTUM TO FORM ADHESIONS

From these experiments it would seem that *the omentum is especially adapted for the forma-*

tion of adhesions. The defensive rôle which the omentum apparently plays is dependent upon (1) its wide area of mobility as simpy one portion of the peritoneum; (2) its comparative richness in blood-vessels and fat; and (3) as a result of its ability to form adhesions. The power to form adhesions enables the omentum to isolate infective processes, and thereby reduce their effects upon the organism. To assume, however, that the omentum can perform the multiplicity of functions which are ascribed to it by the majority of authors (De Renzi et Boeri, Cornil, and Carnot) is not justified by any evidence we possess. Nor does the omentum *attack foreign bodies invariably; the body must be accessible.* Where the omentum is short and the foreign body is fixed in the pelvis, or is incarcerated between the gut and the wound in the abdominal wall, or between the heavy large gut and posterior parietes, the omentum is not apt to exert its supposedly protective function. In a few cases the omentum was remote from the lesion and appeared entirely unchanged as far as shape, consistency, or position are concerned, while in the remainder, especially where a foreign body was caught between the intestines and abdominal wound, the omentum was only partly involved.

In order that the omentum may form adhesions, there are necessary three factors: (1) A gross lesion; (2) a certain amount of exudate;[1] (3) the injured viscus must possess a certain fixity as well as accessibility. The part of the omentum nearest the lesion is that involved in the adhesive formation. In inflammatory lesions the large gut, with its sluggish peristalsis, and the fixed viscera, are more predisposed to omental attack. The urinary bladder and small intestines are comparatively less frequently attacked than the cecum, appendix, and female genitals. The absence of vesicouterine adhesions, as compared with rectouterine, is noteworthy. The frequent changes in the mobility of the bladder are probably responsible for this phenomenon. Because of its bigger range of motility, and more active peristalsis, the small intestine is less apt to become adherent to the omentum. As a general rule, adhesions between the omentum and intestines are more apt to be permanent than adhesions between the intestines themselves.

[1] In the great majority of these experiments, though dry gauze packing was used to keep the intestines out of the way, no adhesions either between the intestines or with the omentum were observed at autopsies.

RELATION OF OMENTUM TO ABDOMINAL INCISION

The omentum may behave toward the abdominal incision in a number of ways, as I have shown by a number of experiments.

1. The omentum may be included in the peritoneal stitch at the time of abdominal closure.

2. The peritoneal suture may have been imperfect, and give rise to gaps through which the omentum prolapses and sooner or later becomes adherent. Interrupted stitches were more apt to give rise to adhesions than the continuous suture.

3. When infection at the line of suture took place. In some cases a silk suture acted as the foreign body, where this was exposed in the peritoneal cavity.

When all these conditions were obviated, no omental adhesions were noticed.

Neuhof and Wiener have recently published a report upon the problem of omental adhesions. Their earlier experiments led them to the conclusion that the intact omental edge alone is concerned in the formation of adhesions, and that denuded portions of the edge cannot become adherent. In their subsequent work, however, they found that even wounded or raw portions of the omental edge became attached either to the laparotomy wound, to some abraded or wounded portion of the intestine, or that adhesion could "occur independently of peritoneal denudations or foreign bodies." In inflammations of the peritoneal cavity, the omental surfaces as well as the edge, were found adherent. The authors also found that the omentum did not attack foreign bodies, e. g., lead shot, when introduced into the abdominal cavity of rabbits. These shot lay imbedded in exudates, and in several instances were attached to the prevesical fat.

The results of their experiments, in the main, coincide with my own. Inasmuch as

their work, however, was conducted on rabbits, it is not surprising that their early conclusions should have ascribed the formation of adhesions to the free edge. The free edge of the omentum in rabbits is the most highly developed portion of the omentum, while the body of the omentum in the same animals is practically insignificant. The behavior of edge and body of the omentum in animals like the cat and dog, as we have seen, is quite different, and while the free edge is more apt at first to become attached to foreign bodies, (see experiment on spleen) the surfaces, if not simultaneously attached, soon become involved in the adhesion or encapsulation. This would seem to approach nearer to the conditions as found in man, as our pathological studies showed.

THE PREVENTION OF OMENTAL ADHESION WITH THE LAPAROTOMY WOUND

The chief requisite is the *careful application of a continuous catgut suture*, care being exercised not to include the omentum in the stitch. Moreover, the suture must be tight; there must be no gap between the lips of the wound. The broad approximation of the peritoneum, as recommended by Neuhof and Wiener, does not seem essential, nor is it even on theoretical grounds, an advisable procedure. The peritoneum, being made taut by this method of closure, would be liable to tear apart in the line of suture, especially under the increased abdominal pressure entailed by such acts as postoperative coughing, retching, and vomiting. On the other hand, by sewing as near to the peritoneal edges as possible, enough excess of parietal peritoneum would be provided to accommodate itself to the increased abdominal tension, and so lessen the strain on the suture line.

THE PREVENTION OF POSTOPERATIVE ADHESIONS

The introduction of some fluid seems a very useful and serviceable procedure, particularly in cases where relief of postoperative adhesions is desirable. This suggestion is offered us by the conditions noted in ascitis, in which adhesions are rendered incapable of forming. Not only oil, as Wilkie has lately demonstrated, but a *sufficient amount* of saline solution, or more preferably perhaps, an equivalent amount of sterile ascitic fluid, would serve the same end. The only requirements for such fluid would be that it must not be absorbed too soon, and that it must not excite a reactive inflammatory process. If salt solution is used the quantity would have to be very large. The use of transudates, as ascitic fluid, to prevent adhesions, still waits experimental support.

THE BEHAVIOR OF THE OMENTUM WHEN SEVERED FROM ITS BLOOD AND NERVE SUPPLY

1. In one series of experiments *resection of the spleen* was done together with *resection of the omentum*, and *reposition of both in the abdominal cavity*. In one animal the spleen and omentum were found massed together, enclosed between the intestinal coils and fixed to the abdominal wound, but without any attempt at encapsulation. In the remainder the omentum was necrotic and was attached to the laparotomy wound. The spleen was found between loops of intestine and showed practically the various degenerative changes described in the other experiments.

2. In two animals *auto-graft of the omentum* was made. A series of chain ligatures with the ends left long were taken around the gastric attachment of the omentum. The free ends of the ligatures were successively passed through the posterior leaf of the mesentery of a portion of the small intestine and tied. In this way the omentum hung down from small intestine instead of stomach. The breadth of the new attachment was about that of its original insertion. The omentum was found four days later rolled into a soft necrotic mass, adherent to the intestines and to the abdominal wound. The spleen was undisturbed.

It is thus seen that the action of a spontaneous, intelligent mobility on the part of the omentum cannot be maintained. Nor does it restore vitality to impoverished organs, as De Renzi and Boeri wished to show. Talma's operation was based on this very idea. As I have shown, the end result of adhesion formation between the omentum and another viscus, when the viscus is de-

tached, is either destructive to the detached organ, or the formation of more or less permanent, comparatively bloodless adhesions, results.

There have been some publications of a very remarkable condition of the omental vessels which have been supposed to undergo compensatory enlargement in cases where the omentum has incorporated a tumor. (Smith.) Even in this case it has not been demonstrated that the omentum was the sole source of blood supply of the attached tumor. I have seen, while House Surgeon at Mount Sinai Hospital, in the service of Dr. Krug, a remarkable example of a "dermoid ovarian tumor" which was embraced firmly by the omentum. This tumor was detached almost completely from the broad ligament except for one thin strand which still connected the tumor to the tube. The omentum showed a condition of axial rotation following upon the recent termination of a normal pregnancy. Such cysts require little vascular supply. More solid tumors, like myomata, are apt sooner or later to become calcified or necrotic when incorporated into the omentum.

THE PROTECTIVE RÔLE OF THE OMENTUM

Rogers resected the omentum in rabbits and guinea pigs. In from fourteen days to two months after the resection, he injected a few drops of culture of staphylococcus intraperitoneally. While control animals survived, the former succumbed in two or three days. When less virulent or smaller quantities of the same culture were injected, the animals in which the omentum had been resected, emaciated and died. The control animals, however, survived. In fourteen cats, in whom I resected the omentum, eight died within two weeks after the operation. Postmortem revealed no gross lesion of the spleen, except a diminution in size. In one cat a bronchopneumonia was found. In another there was fluid in the pericardium. In no instance did a peritonitis develop. The stomach was small and contracted in every instance. Death was probably accounted for by the fact that these animals were all kept in a cage under unhygienic surroundings and were practically allowed to starve. When the remaining six, already emaciated, were removed to another room, and were given plenty of light and a liberal supply of food, they speedily thrived and became of use for purposes of absorption experiments.

THE ABSORPTIVE ACTION OF THE OMENTUM

Clairmont and Haberer, in their work on the absorptive capacity of the peritoneum, showed what Muscatello, Von Recklinghausen, Schnitzler, and others had already demonstrated, namely, the difference in resorption from the diaphragmatic peritoneum and that of the rest of the abdomen. They made use of the ingenious method of painting collodion over the diaphragmatic peritoneum for the purpose of blocking the ostia. Absorption was delayed. In the same way when a portion of the parietal peritoneum was resected there was a delay in absorption. K. I. was used in solution, and tests were made in the urine excreted within a few minutes to forty-eight hours, in order to see how soon the iodine would be discovered. Further tests were carried out to determine the time required for the total elimination of the K. I. They also induced artificial peritonitis in other experiments, with a view of ascertaining its influence on absorption, as measured by the K. I. Unfortunately, in their numerous experiments, the omentum was scarcely considered.

It occurred to the writer that, inasmuch as the omentum is a wide expansion of peritoneum,[1] it should serve as an important factor in the absorption. Accordingly, *resection of the omentum was practised in a series of cats; an equal number of normal cats served as controls.* Indigocarmine, instead of K. I., was injected intraperitoneally. The same method of injection as that of Clairmont and Haberer was employed. Owing to the fact that catheterization in cats is very difficult, squeezing the bladder, which is easily done, was resorted to, and small quantities of urine at intervals of three minutes were expressed. I confirmed the observations of Clairmont and Haberer, that anæsthesia had no appreciable effect upon the rate of absorption. In

[1] A resected omentum of a cat, for example, when unfolded and spread out measures from 225 to 400 and 500 square centimeters.

five cats, in whom the omentum was resected, a bluish coloration of the urine was observed forty to sixty minutes after injection. In one cat, blue urine appeared after twenty-four minutes; this cat had been permitted to run about immediately after the injection, while the others were kept on their backs. In the control animals, subcutaneous and intraperitoneal injections showed an excretion of the indigocarmine within twelve to fifteen minutes. In these animals the omentum was then resected, and seven to eight days later the injection was repeated, the same relative delay in the elimination of the indigocarmine as in the first series, was noted. One cat, in whom the omentum had been resected, died from anæsthesia half an hour after the injection. On opening the abdomen, the blue solution of indigocarmine was confined for the most part to the posterior parietes; the intestines were practically free from the solution, while neither the opened bladder, nor the pelvis of either kidney showed the slightest trace of blue coloration. (The time required for the total elimination of the indigocarmine was not determined.)

Incidentally, it was noted, that of twenty cats with omental resection, there was no embolism of remote viscera, nor were there bloody stools, which, according to Witzel, is liable to happen because of the increased congestion of the intestines whose blood supply the omentum is normally supposed to regulate.

THE ACTION OF THE OMENTUM IN THE PRESENCE OF PARTICLES IN SUSPENSION

Heger used *lampblack*, *cinnabar*, *sulphurate of mercury*, *vermillion pigment*, *bismuth subnitrate*, and introduced these substances into the peritoneal cavity. In the case of the lampblack he saw black strands along the omentum; the mesentery and the peritoneum showed no similar infiltration. While Muscatello believed that these particles are carried by wandering leucocytes, and absorbed by the abundant lymph channels in the omentum, Heger holds that the body of the omentum accomplishes the attachment of the particles by a sort of "balayage" or sweeping movement, which the action of the diaphragm facilitates.

Heger employed for his purposes:

1. Adult animals (guinea pigs, rabbits).
2. The same animals, in which the omentum was resected.
3. Very young guinea pigs and rabbits, in which the omentum is very small, and
4. Frogs and fish, in which no omentum can be found.

In those animals in which the omentum is absent, particles injected intraperitoneally are disseminated in the abdomen, and remain on the surface of all the organs. At the end of forty-eight hours the apex of the lungs shows an infiltration by these particles of pigment. The same phenomenon was seen in young rabbits, in whom the omentum is rudimentary. In three fish, in each of whose abdomen three lead shot had been introduced, there were no signs of encapsulation. Heger introduced fifty glass beads, varying from one to three millimeters in diameter, into the peritoneum of a dog; at the end of four days all the beads were found attached to the great omentum. One group of twenty beads were found near the stomach border, another group of ten beads were seated near the free border of the omentum, the others were disseminated throughout the omentum. There was no hypertrophy and no change in the appearance of the omentum. After the fourth day the development of connective tissue renders the pearls less visible. By means of the X-ray and fluoroscope, Heger could observe the up and down movement of these glass beads; moreover, he thought he could see the beads wander up towards the diaphragm. He concludes that the motility of the omentum is dependent essentially upon the movement of the diaphragm; the movement of the stomach and intestines play but a small rôle. The defensive power of the omentum, according to Heger, consists in its agglutinating secretion, which enables it to form adhesions at a focus of irritation.

REPARATIVE FUNCTION OF THE OMENTUM

Cornil and Carnot tied a ligature around the upper third of the urinary bladder of dogs, cut out the upper segment, and sewed the

omentum to the edges of the opened bladder. The animals survived, and the omentum formed the new roof for the bladder. Epithelialization had taken place from the bladder mucosa. They found similar results when the ureter was treated in a similar way. I have undertaken several experiments to see if the omentum could spontaneously bring about the result. (The experiments were carried out in cats and dogs, in whom the omentum is long and well developed.) The bladder was treated as in Cornil and Carnot's experiments, without, however, sewing the omentum to the wound. Silk was used for constricting the bladder, so that its patency was insured, and leakage into the peritoneal cavity prevented. One animal succumbed to peritonitis; three survived. In none of these three cats was the omentum found attached to the bladder. It is interesting to note that in one instance the left "mesouterus" formed a new roof for the opened bladder, and in the other cases the paravesical fat formed the attachment.

To still further test the reparative function of the omentum, the following operations on the intestinal tract of cats and dogs were performed:

(*a*) Gastroenterostomy.

(*b*) Enteroenterostomy (cecum and sigmoid, sigmoid and sigmoid, ilium and cecum).

(*c*) Perforation of gut.

(*d*) Appendicectomy.

Gastroenterostomy and enteroenterostomy (*a* and *b*). In all these experiments the omentum was found attached to the line of suture. Where the closure was complete and perfect, the animal survived and the omentum (both the free edge and part of the body) was adherent to the suture line. No evidences of peritonitis were observed. Where the suture was imperfect the animals died, in these there was purulent general peritonitis; the omentum was found adherent to the anastomosis, thickened and congested, but leakage had nevertheless taken place. The remaining part of the omentum was attached to intestinal coils, and to the abdominal wall.

(*c*) Perforation of gut. The experiments were carried out upon six dogs. In one, the large intestine was perforated with an anatomical forceps and a hole three-sixteenths inch in diameter was burned into the gut; the animal was given morphine and placed in Fowler's position. The dog reacted promptly from the anæsthesia, suffered no pain, and lived ten hours. Autopsy showed a profuse purulent peritonitis, due to leakage of feces, *which was confined largely to the pelvis*. The omentum was loosely attached to the intestines and parietes, and only loosely at the point of perforation. In the remaining five animals a hole was burned into the gut by means of the smooth end of a file, which was of the thickness of the sharpened point of a pencil. The hole thus made varied in size between one to four millimeters. These dogs made a prompt postoperative recovery and, while some remained quiet for two or three days, the others were active, ran about, and behaved as though no operation had been done at all. *Upon laparotomy the omentum was found attached to the seat of the perforation*, but nowhere else.

It must be noted that the same experience was met with in experiments (*a*) and (*b*). I could count on the omental attachment to help me identify the place of the anastomosis. In two dogs a slight amount of fluid or a few flakes of fibrin were present in the peritoneal cavity the first few days after the operation. With this method of perforation, no leakage from the gut was observed, the gut contracted around the orifice and only the smallest drop of intestinal contents exuded. It is possible that when the perforation is gradual from the start, the omentum will wall it off, and prevent leakage into the peritoneal cavity. If the perforation is sudden and large, such a result cannot be expected. In Fowler's position, the free edge of the omentum would serve to wall off the exudate or pus collection in the pelvis from the rest of the peritoneal cavity, while the surfaces of the omentum, becoming attached to the abdominal parietes and intestines, would further prevent the spread of the infection toward the dangerous area of the diaphragm.

(*d*) After appendectomy, the omentum became attached to the stump. Adhesions resulted, even when carbolic acid was used to cauterize the stump of the appendix. As

a general rule, catgut was less apt to "attract" the omentum than silk. Catgut was used in the later experiments in order to eliminate the immediate irritation from the silk.

CONCLUSIONS

1. The omentum has *no spontaneous motility*. The displacements of the omentum may be explained by: (*a*) intestinal peristalsis; (*b*) intra-abdominal tension; and (*c*) the static condition of the stomach and colon and of the small intestine; (*d*) the anatomical relationship of the omentum to the gall-bladder and spleen.

2. The omentum has no demonstrable "chemotaxis." The amount of intraperitoneal fluid plus the amount of gas contained in the large intestine account for this apparent intelligent retreat of the omentum from virulent infective processes. In addition the suction action of the diaphragm under changed conditions of intra-abdominal tension explains the apparent upward "chemotaxis" of the omentum in inflammatory lesions of the upper abdomen.

3. The omentum has no intelligent and spontaneous protective rôle. Such protection as it apparently displays is simply due to its properties as peritoneum, and not as a superior organ with definite functions.

4. It cannot restore vitality to necrotic organs, nor vascular supply to those deprived of their circulation. The end product of an adhesion between the omentum and a foreign body is the destruction of the foreign body; between the omentum and any other abdominal viscus is scar tissue.

5. The omentum does *not invariably spontaneously* repair defects in hollow or solid viscera; it does this imperfectly in man. Experimentally when the rent is not too large the omentum seems to occlude it and prevent leakage from the intestine. In perforated appendicitis, for instance, while the omentum is present in a great number of cases at the seat of the perforation, peritonitis, due to leakage, nevertheless frequently occurs.

6. The usefulness of the omentum in inflammatory lesions of the abdomen depends upon (*a*) its power to form adhesions which isolate and render innocuous toxic products; (*b*) to its power of absorbing and eliminating toxic products or destroying them by virtue of its phagocytic elements. But when contrasted with the sequelæ, intestinal obstruction, pain, etc., its beneficence is overbalanced.

7. The chief functions of the omentum are those of any other mesentery, namely: (*a*) the fixation of viscera; (*b*) vascular supply.

8. When the omentum is found adherent to an intra-abdominal tumor the probabilities are that the mass is inflammatory, and not neoplastic. If the tumor is adherent to a neoplasm, the tumor invariably has undergone inflammatory changes. (Ovarian dermoids.)

9. In exploratory gall-bladder operations it is well to remember that an "adhesion" between this viscus and the omentum does not necessarily mean inflammation. The adhesion may be a normal mesentery of the *gall-bladder*, contributed by the omentum. Care should be exercised, therefore, in the examination of the adhesion before it is unnecessarily separated, and before the gall-bladder is removed.

10. The best method of preventing adhesions between abdominal incision and omentum consists in the application of a continuous peritoneal catgut suture. Areas of the abdominal cavity uncovered by peritoneum lead almost invariably to adhesion formation.

11. The omentum is capable of absorbing large quantities of fluid and particles in suspension. Larger particles are attached in a purely mechanical way. The latter is controlled by the action of the diaphragm and intestinal peristalsis.

12. Too much should not be expected from grafts of the omentum. A detached piece of omentum rapidly becomes necrotic, and is useless. Only intact portions of the omentum produce serviceable adhesions.

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PRIMARY SARCOMA OF THE APPENDIX

BY EVERETT O. JONES, M. D. SEATTLE, WASHINGTON

SARCOMA of the intestinal tract is not common, and a primary sarcoma of the appendix is an extremely rare occurrence. Nothnagel in his enumeration of sarcoma of the alimentary canal does not note a single case. From time to time cases of sarcoma of the appendix have been reported, but in the majority of these the descriptions of the microscopical findings have been indefinite and unsatisfactory. In 1893 Gilford reported the first authentic case, and the first recorded in America was reported by J. C. Warren in 1898. Up to the present time eight cases in all have been recorded in the literature, four of which were reported in this country. Because of the rarity and special interest attached to sarcoma of the appendix the writer deems the following case of sufficient interest to merit reporting.

Mrs. F., 26 years of age, was referred by Dr. Taggart of Bremerton, Washington. Her family history is of no importance except that her father died at the age of 53 of a metastatic sarcoma of the retroperitoneal lymph glands, which resulted from a primary growth in the testicle.

The patient herself had the usual diseases of childhood, and also suffered from a severe attack of typhoid fever, but otherwise enjoyed good health, until four years before the time I first saw her. While running to catch a boat her foot slipped and she fell, striking her side against an upright post on the dock. She had to be carried home and suffered so much pain that a hypodermic of morphine was required to relieve her.

Pain and tenderness persisted in the lower abdomen for two weeks. A few months later a similar attack came on spontaneously, and during the following four years she averaged an attack about once every six months. These attacks were quite uniform in character, and began suddenly with pain in the lower right abdomen. Nausea was present but never vomiting. There was always marked local tenderness and usually considerable general prostration, which often persisted some time after the pain had subsided.

When I first saw her in March, 1910, she had been sick for three weeks with symptoms quite similar to her previous attacks, except that they showed no disposition to abate. She was confined to her bed, suffered constant pain in the right lower abdomen, and felt extremely weak and prostrated. The appetite was poor and the bowels were moderately constipated. The patient was pale and somewhat emaciated, the abdomen flat. Inspection disclosed at once a small tumor apparently the size of a walnut situated at McBurney's point. This tumor was hard to the touch, quite immovable, and very tender. There was moderate muscular rigidity over the lower abdomen. Percussion note was everywhere normal. The pulse was 100 and the temperature normal. Further physical examination revealed nothing abnormal. The blood examination gave hemoglobular 70 per cent, red blood cells, 4,000, whites, 12,000, polynuclear neutrophiles, 78 per cent. Her physician assured me that her temperature had been normal throughout the

attack, and that this was also the case in two previous attacks during which he had attended her. The visible and palpable tumor had only been evident during the last two weeks. A diagnosis of recurrent appendicitis, with probably a small circumscribed abscess, was made, and appendectomy advised.

Operation March 15, 1910, disclosed the head of the cecum covered with what appeared to be adhesions, which were peculiarly friable, and out of the center of which the appendix was excavated with the finger. As the appendix was being freed two or three drops of a milky white fluid exuded from the mass. The appendix when separated was found to be of the same peculiar friable consistency as the mass in which it was buried. Suspicion of a possible malignancy was aroused by the peculiar appearance of the tissues, but not feeling certain, the wound was closed after a simple appendectomy. The specimen was submitted at once to microscopical examination. The report being sarcoma, five days later the wound was reopened and the cecum resected, the ilium being joined to the ascending colon by lateral anastomosis.

The subsequent recovery of the patient was uninterrupted. She left the hospital at the end of the third week, and at the present time reports herself as enjoying better health than at any time during the past four years.

Microscopic section showed the growth to be a pure spindle cell sarcoma, composed of solid masses of cells, containing large vesicular nuclei, and with here and there a fine fibrillar intracellular stroma. Serial sections made through the appendix and the adjacent walls of the cecum showed the growth to have originated in the submucosa of the appendix, about midway between the base and tip. It grew outward invading successively all the coats of the appendix until the serosa was involved, it then extended to the serous covering of the cecum, probably because pre-existing adhesions had already bound the appendix in its whole length to the wall of the cecum. Sections through the appendix taken at the edge of the tumor show columns of cells growing outward from the submucosa and infiltrating the inner muscular coat, also sections of the cecal wall show the tumor invading the serosa with here and there groups of cells infiltrating the outer muscular layer; no tumor cells were found at a deeper layer in the wall of the cecum. The mucosa of the appendix was everywhere uninvolved, though considerable round cell infiltration was present.

It would appear that we have here a mild recurrent appendicitis, occurring in a patient possessing a hereditary tendency toward sarcoma formation. The low grade inflammatory process eventually resulted in a true sarcoma, which because of the adhesions already existing was enabled to extend from the appendix to the wall of the cecum, although the point of origin of the tumor was at some distance from the base of the appendix.

The following cases have been collected from the literature:

CASE 1. Gilford. A woman, aged 27 years, with symptoms of chronic appendicitis for thirteen years. Spindle cell sarcoma of the appendix, which was adherent to the colon and ilium, neither of which was involved.

CASE 2. Warren. Boy, with symptoms of chronic appendicitis, intermittent pain and fever for one month. Tumor at ileocecal angle with involvement of the appendix. Round cell sarcoma with glands extending to the root of mesentery. Simple appendectomy. Was well four years later.

CASE 3. Glazebrook. A colored man, aged 55, died of apoplexy. At the autopsy the appendix was found to be enlarged to the size of a pigeon's egg, and surrounded by dense adhesions. Fibrosarcoma of the tip of the appendix, originating in the serosa, and invading all coats.

CASE 4. Patterson. Man, aged 39 years. Uneasiness and occasional pain in the right iliac fossa for three months. An acute attack with vomiting just before operation. A tender mass palpable. Diagnosis, chronic appendicitis. Operation, appendix found to be thickened and adherent. The wall of the cecum thickened for a quarter of an inch about the appendix. This thickened portion was removed with appendix. Patient died six hours later. Autopsy showed no trace of tumor elsewhere. Round cell sarcoma, involving all coats except serosa.

CASE 5. Carvardine. Woman, aged 45, had symptoms of appendicitis for five months. Had severe pain in right iliac fossa, attacks of diarrhœa, and severe colic, a deep seated tender swelling present. Operation showed appendix three and a half inches long, size of thumb, very hard, adherent and peculiarly friable. Cecum not involved, but the head and a neighboring enlarged gland removed. Recurrence on left side. Death nine months later. Round cell sarcoma.

CASE 6. Carvardine. Man. Appendix removed for recurrent appendicitis. Central portion contains a concretion. At tip is situated a white colored tumor the size of a hazel nut. Some neighboring glands enlarged. Round cell sarcoma. Author calls it lymphosarcoma.

CASE 7. Bernays (reported by Kelly and Hurdon). Woman, 29 years of age, negative family history. Symptoms of chronic appendicitis for one year. A hard tumor palpable in the right iliac region. Temperature normal. Operation, appendix found free, distal portion normal, proximal portion large and firm, adjacent cecal wall infiltrated for short distance on one side. Complete excision of cecum. Recovery. Round cell sarcoma involving all layers of the appendix. Two years after operation patient showed a tumor in the abdomen which was considered to be a recurrence. (This case was ruled out by Rolleston and Jones on the ground

that the tumor was not primarily of the appendix. This criticism does not seem well founded by the writer.)

CASE 8. Stewart. Man, 35 years of age. In course of a year had three attacks of what was diagnosed recurrent appendicitis. Each attack more severe. Pain, muscular rigidity, vomiting, pulse, 100, temperature, 102°. Operation, appendix found in the ilieocecal fossa, buried in what were taken for adhesions. Appendix enucleated with the finger. Simple appendectomy. Spindle cell sarcoma.

From the cases available for analysis it would be useless to attempt to build up a clinical picture by which a diagnosis of sarcoma of the appendix could be made. Indeed, as has already been pointed out in the histories reported, a diagnosis has never been made before operation. This is hardly surprising since the symptoms in every instance were of appendicitis in one form or another. The extension of the growth to the cecum usually gives rise to symptoms which might lead to a correct diagnosis. Yet in three of the cases such an extension had taken place and in each instance a diagnosis of recurrent appendicitis, with possible circumscribed abscess, was made.

In the one case in which the condition was found at autopsy, the growth was probably in no way associated with the cause of death. The reason which led to operations in all of the other eight cases were symptoms of a more or less chronic appendicitis. In one case there was continuous pain in the right iliac fossa for a month, in another for three months, and in six there were recurrent attacks extending over periods ranging from one to thirteen years.

In some then the condition appears to have been relatively acute, while in others the symptoms had extended over many years. Can these extremes be reconciled with the view that the growth is directly or indirectly the cause of the symptoms, or must it be assumed that the growth is a mere accidental occurrence? In the more acute cases it is easier to admit the possibility of the growth being the actual cause of the inflammatory trouble. For such a growth might predispose the walls of the appendix to infection, or it might block the lumen, or interfere with the nutrition of the tissues by compressing the blood-vessels.

In those cases with long standing symptoms the obvious objection that the growth, if the primary cause, would long since have given rise to metastases or have spread locally and have caused the death of the patient, can be met in part by the fact that these tumors are not prone to form metastases. Letulle, Weinberg, and others have laid special stress on the probability that chronic inflammatory change is the precursor of a malignancy in the appendix, just as it is well known to be in the female breast and the stomach.

The true explanation of the great divergence in symptoms and course of the disease is probably this, that the growth is at times the cause and at times the effect of the changes producing the symptoms. In those cases of comparatively short duration or in which the growth is the predominant feature, it is probably the direct cause of the symptoms. In those cases of chronic appendicitis in which the growth is only discovered by the aid of the microscope, it is probably the result of the long continued inflammatory process.

The extent of operation called for in these cases has often exceeded the simple removal of the appendix. Of the eight operated cases here reported, in four the cecum and enlarged mesenteric glands were resected as well as the appendix. Yet it is to be said that in none of the cases in which simple appendectomy has been done has there been recurrence reported. The only certain case of recurrence after operation is that of Carvardine, and in this the cecum as well as the appendix was removed.

The results of operation both immediate and remote have been surprisingly good. Of the cases here reported there was one death immediately following operation, and one nine months after caused by recurrence. In the case reported by Warren he mentions that the patient was well and free from recurrence four years after operation. This is striking evidence of the slight malignancy of these growths as compared with those in all other parts of the alimentary canal.

CONCLUSIONS

1. An accurate diagnosis before operation appears to be impossible. In every case the symptoms were those of some type of appendicitis.

2. Pathologically the round cell sarcoma predominates, next to this, the spindle cell type.

3. Inflammatory changes, either chronic or acute, very frequently accompany the growth.

4. The immediate prognosis and prospect of freedom from recurrence are very good.

5. The fact that primary sarcoma of the appendix may take its origin in an inflammatory process forms a very strong additional argument for the removal of all appendices which show evidences of inflammation.

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STONE IN THE URETER[1]

BY R. C. BRYAN, M. D., RICHMOND, VIRGINIA

STONE in the ureter is much more prevalent than is supposed. Many roentgenologists pronounce this condition to be of greater frequency than renal calculi. According to Leonard 50 per cent of all calculi occur in the ureter. This is not an extravagant statement when we recall that ureteral calculi may arise *primarily* when this tube, by reason of internal or external insults, suffers a congestion, displacement, or physiologic embarrassment, and *secondarily* from the kidney, where all stones originate and attempt at some time in their life's history, to enter the ureter and thus gain the outer world.

Ureteral stone is usually single, occasionally multiple, exceptionally bilateral. Multiple stones occur, according to Tenny (36), once in eight times in ureteral calculus.

The following series are the cases which the writer wishes to report, with observations derived therefrom.

CASE 1. June 1, 1910, referred by Dr. Nelson. C. M., married, age 26, agent. Until six months ago was perfectly healthy, denies venereal disease or any infectious disease. On Christmas day, 1909, had a very severe pain in region of the left kidney. A physician called in pronounced it kidney colic and administered morphine. Aside from a little soreness and occasional discomfort, aggravated by traveling, jolting, buggy riding, etc., the patient attended to his work (sales agent) until May 28th of the present year, when he had another very severe attack of pain in the small of his back and left side which radiated to the glans penis. Urinalysis showed nothing of any significance (probably on account of the apparent complete obstruction found at operation).

Cystoscopy in this case was not performed. X-ray by Dr. Gray (see Fig. 1, case 1) showed stone opposite 4th lumbar, vertically situated, about the size of a black eye pea. This patient never noticed any blood in the urine nor was there a pollakiuria, pain being the only one of the three cardinal symptoms present, there being only two distinct seizures of these, six months apart; in the interim, the soreness and distress in the small of the back, though constantly present, was never severe enough to cause him to stop work.

June 4th an extraperitoneal lumbar incision exposed the kidney, the stone was found impacted, wedged in the ureter about 3½ inches from the pelvis, which was dilated and thickened proximally to the size of the little finger. Incision over the stone which was removed, two small oo catgut sutures approximated ureteral wound, and drainage tube inserted, which never conducted any urine to the surface.

June 19th, went home.

[1] Read at the Twenty-third Annual Session of the Southern Surgical and Gynecological Association in Nashville, Tennessee, December 13-15, 1910.

July 30th, wound entirely healed.

October 30th. Patient reported feeling splendid. No urinary symptoms of note, no pain, no discomfort, and urinalysis negative.

Remarks: 1. Characterized by pain, two attacks.

2. The absence of significant epithelia and cellular elements accounted for by the apparent complete blockage of the ureter, although the kidney appeared perfectly normal and there was no thickening or distension of the pelvis.

3. Though the stone was impacted at the time of operation, it must have been playing as a ball valve, allowing an intermittent escape of the urine. The first attack of colic arose when the stone became engaged in the ureter; the second probably occurred with the development of a transient hydronephrosis.

CASE 2. March 16, 1910, referred by Dr. W. R. Jones, W. G. P., age 57, married. Enjoyed good health until six years ago when he had a growth which was pronounced cancer removed from the larynx. Two years ago had kidney colic on left side requiring morphine. Has had no attack since, but has constantly an uncomfortable sensation along the course of the left ureter which is localized in the left lumbar region and unreflected. For three months has been noticing blood which is mixed with the urine, is not terminal, and darkens the urine at each act.

Examination. Tall, anemic man, prostate normal, no adenopathy, bladder irrigated with adrenalin. Capacity 14 ounces. Left ureteral mouth somewhat congested and pouting, somewhat reddish, clouds seem to emit from the orifice. No. 7 F. ureteral catheter inserted with no difficulty as far as renal pelvis which, with the ureter, was thoroughly flushed out with adrenalin solution and boric acid. Right ureteral os normal. Instrument removed. Patient allowed to walk home. X-ray in this case negative. Urinalysis not carried out on account of discoloration.

April 1st. From 9 P.M. to 2 A.M. experienced a severe attack of pain in region of left kidney; stone passed, heard to click in the vessel but was not secured although he had been warned to look out for it. The relief was immediate.

October 20th. There has been no blood since April 1st, patient is perfectly comfortable and feels better than at any time since the trouble began two years ago.

Remarks: This case was characterized essentially by hematuria and though there was no urinalysis made and X-ray was negative, there seems to be no reasonable doubt but that the trouble was stone in the ureter. This is an instance where the catheter easily slipped by the stone. How this occurred will be referred to later.

CASE 3. May 21, 1910, S. M., referred by Dr. J. G. Nelson, age 40, married, colored, laborer. Has two children. Thirteen years ago contracted gonorrhœa pronounced cured in a short while, no complications. For ten years has had some pain in back about region of kidneys probably a little more on the left than on the right, but no history of a distinct attack of kidney colic. During this time has frequently had in the act of urination discharges of a whitish material which felt gritty between the fingers. At times this came away in lumps. Has never noticed any blood in the urine nor is there any pain on the passage of this grit. Recently the discomfort in the back and about the kidneys has been so distressing that he was unable to do any work. This pain is well localized over the kidney region, is of a dull burning character, does not radiate to the testicle, penis, or thigh and is relieved in a measure by recumbency and heat. He has found out from experience that drinking large quantities of water daily also alleviates the pain. He urinates no more frequently by night than formerly, but very frequently during the day, probably every hour or so.

Examination. May 28th. Short, compact, healthy man. Prostate normal, somewhat congested, vesicles normal.

Cystoscopic. Bladder capacity 18 ounces, urethra took 23 F., bladder mucosa healthy. Right ureteral mouth normal, left, pouting, edematous, crater-like. Peripheral injection; ureters not catheterized. From the appearance of the left ureteric mouth stone was suspected. X-ray by Dr. Gray, May 30th, showed two stones in the left ureter, anterior to the sacroiliac joint, the larger below, the smaller above. (See Fig. 2. case 3.)

Urinalysis. Dr. E. G. Hopkins, pathologist Virginia Hospital; amber, alkalin, 1024, chlorides, phosphates normal, indican considerable, blood small amount, pus few, corpuscles, crystals, calculi, oxalate and ammonium, urates very abundant, phosphates considerable, no casts, epithelial, renal pelvis and bladder few. Diagnosis: Suggests stone.

June 4th. Patient reported having had more pain than usual in loins and some radiating to the head of the penis, decided to go to hospital.

June 10th under chloroform anæsthesia, the catheterizing cystoscope being somewhat painful, the left ureter was readily catheterized. At about five inches a slight obstruction was felt, which was pushed aside however, and the pelvis of the kidney attained. A warm sterile olive oil solution with adrenalin 1:20,000 was injected into the pelvis and as the catheter was withdrawn this solution was forced in. The globules of oil returning into the

bladder were immediately noticed. When the catheter was within one inch of the mouth of the ureter, the solution was squirted forcibly into the ureter and held so for a minute or more. An interesting point is here noted, the pouting ureteral mouth became more swollen and the mucous membrane cloudlike and more puffy. The instruments were withdrawn and the patient returned to bed.

June 14th. Passed a little, round, soft stone about the size of the head of a pin.

June 18th. Felt more comfortable than in some time. The pain in the back much relieved.

June 25th. Passed another small stone on June 23d and passed at intervals mortar and grit. On the morning of the 23d had severe pain in back and had to go to bed.

June 27th. 9 A. M. Had the most severe pain yet, in same place (small of back and in region of bladder). Hot water bag and enema gave some relief. At 8 P. M. voided a stone which was caught in meatus and removed with fingers.

November 10th. Patient reported that he was in perfect health, has had no pain, and noticed none of the gritty substance since the stone voided on June 27th.

Remarks: Characterized by pain and frequency of urination. The pain localized in the back, constant, of a dull burning character, and not radiating. The occasional paroxysms, although great, never produced vomiting, profound shock, or required morphine. The pollakiuria was most significant and of great diagnostic value. It would appear to be nature's method of subjectively attracting the patient's attention. The nervous control of the bladder and the lower segment of the ureter is intimately intermingled and the patient is unable to tell whether the pain is in the bladder, in the ureter, or in the kidney, for that matter. The character of the pain is the same in all three places.

Since the stone, judging from its size, filled the ureter pretty snugly it is a question how the catheter No. 7 got past it. Several explanations may be offered.

1. It may not have passed it but doubled in the ureter (for there was no bulging in the bladder). This seems improbable, however.

2. The stone may have been lying in a diverticulum of the ureter while the catheter crowded by it.

3. It may have been shoved up to the kidney to drop back on removal of the catheter. The caliber of the stone was approximately 11 F. The pouting and dilated ureteral mouth therefore served very well for its passage.

4. This is the only instance of stone in the ureter in the colored race that the writer knows of.

CASE 4. January 20, 1910, referred by Dr. F. K. Lord. Miss E. W., white, age 23, single. Denies diseases of childhood, typhoid, or any infectious diseases; enjoyed good health until six years ago when she was operated on for appendicitis. Has had several attacks of severe pain which were localized in the right hypogastrium and constantly attended with vomiting and prostration. One year later, on account of the continuance of the pain she underwent another operation for adhesions, the incision this time being made in the median line. A year later she was operated on again at the same site for supposed buried suppurating sutures. For six months did well and was free from pain. She then developed a seizure on the left side. The pain was so great that morphine was administered. Since then she has had many such attacks, in nearly every instance, a temporary suppression followed by retention requiring catheterization, occurring. On several occasions she noticed blood in the urine and on one occasion thinks a small stone was voided. Following this for a short time there was considerable relief. Six weeks ago had a violent paroxysm of pain on left side with the *formation of a tumor under the ribs*. This attack was so severe that it required the constant attention of a physician for 12 hours. Four weeks ago, on December 20th, she was taken to the Sheltering Arms Hospital, Richmond, Va., for packed bowel. Discharged in ten days.

Examination. Large, angular, anemic girl, distended and flabby belly wall, particularly sensitive about the left kidney and along the course of the left ureter. Left kidney palpated with difficulty, adhesions, gastrocoloptosis, and intestinal stagnation evident.

January 25th. Cystoscopic. Right ureter, pouting, dimpled, fluffy, crater-like. Left, normal. Right catheterized, No. 7 going easily to pelvis. Specimen (Dr. E. G. Hopkins) showed amber, 1012, neutral, trace albumen, chlorides normal, phosphates diminished; indican, urates no excess; sediment one-fourth of one per cent. Blood small amount; pus few corpuscles. Epithelia, renal and pelvic, considerable.

Remarks: Suggests renal calculus.

January 25th. X-ray, Dr. Gray, stone along the course of and most probably in ureter.

January 26th. Right kidney catheterized, stylet inserted. Second X-ray taken shows stylet tangent to stone. (See Fig. 3, case 4.)

Diagnosis: Stone in right ureter at point of crossing iliac artery.

February 17th. Chloroform anæsthesia, incision

parallel to and above Poupart's ligament from 2 inches above anterior superior spine to superior pubes. Ureter found adherent to reflected peritoneum, much dilated, and thickened to size of little finger. The ureter felt and stripped from renal pelvis to bladder. No stone found. The explanation at the time was that it had been crushed in catheterization or that it had slipped into the bladder. The intramural ureteral segment was not palpated. Catgut sutures and silkworm gut through the skin.

February 19th. Many angular sharp fragments voided, all of them white and of the same size. This continued until the 27th, by which time there had been enough manufactured out of this stone quarry to fill both hands. On the second day of their passage they were proven to be plaster from the wall.

February 27th. A very severe attack of kidney colic on the right side requiring morphine and chloroform. Along the side of an 18 F. examining cystoscope, a small male olivary metallic bougie, size 11 F., was slightly bent with a gentle curve and easily shoved into the ureteral mouth and up about two inches where it was greeted by an unmistakable metallic click. Several other doctors present assured themselves that a stone, probably of dense formation, was certainly present.

March 1st. Bladder cystoscoped, bougie introduced again into the ureter to site of the click and held there by an assistant. The former incision now opened up. The end of the bougie felt in the ureteral wall the stone located about one inch from the posterior wall of the bladder, incision was made over it and the calculus removed. The ureter brought together with two oo catgut sutures, rubber drainage inserted through tissue to ureter, and the belly wound sewed.

March 3d. A few drops of urinary drainage.

March 8th. No urine discharge through wound since 4th. No blood in urine.

March 11th. Up in a chair.

March 28th. Went home.

October 16th. Has had no trouble since discharged from the hospital, and claims to be in better health than she has been since childhood, having gained 30 pounds and working daily.

Remarks: 1. Characterized by pain and retention of urine. Was the original attack of appendicitis the lodging of the stone at the iliac juncture?

2. Were not the subsequent attacks of abdominal distress demanding operative intervention but the expression of this incarcerated foreign body changing its position?

3. Why should this pain have been formerly in the right and during the last two years referred only to the left kidney and ureter?

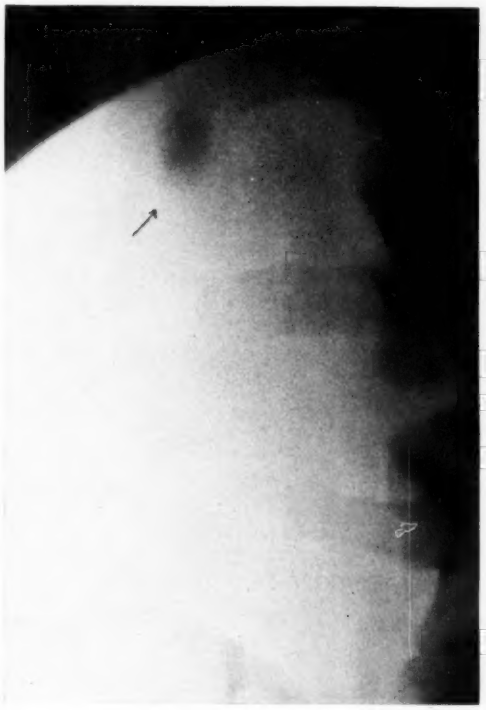

Fig. 1. Case 1. (Man.) Apparent ureteral block at operation, but no pelvic distension or renal involvement. Left side.

4. The flat arrowhead shape of the stone and capacious ureter explains how the catheter got by it so easily.

5. Sounding stone in the ureter (of the female particularly) would seem to be an infallible clue to diagnosis.

6. The operator made a great mistake in not sounding the entire length of the ureter at the first operation. This should always be done, and has been a method of routine in subsequent cases for a possible secondary stone.

CASE 5. September 22, 1910. Referred by Dr. E. G. Hopkins. L. E. W., age 43, married. Venereal history negative. Ten months ago, about the first of the year, began having frequent urination, no pain, no blood, no mucus, simply has to make water about every half hour at night and every 45 minutes during the day, which has so disturbed his rest that he is now unable to attend to his work of telegraph operator.

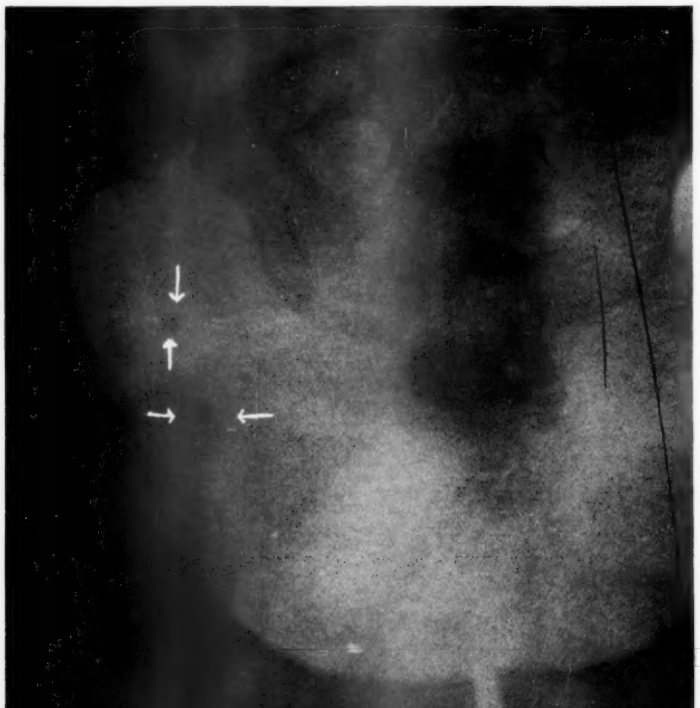

Fig. 2. Case 3. (Man.) Two stones, the smaller above, the larger below, dislodged by the ureteral catheter and later voided. Left side.

Examination. Rather small anemic man, thin and pale. Prostate normal, urethra normal, stone searcher negative. The patient has noticed for some time past that drinking large quantities of water seemed to help him, so consumes about three quarts daily.

Urinalysis made by Dr. E. G. Hopkins, pathologist of Virginia Hospital, shows amber, 1016, alkaline, albumen considerable, sugar negative, chlorides normal, phosphates diminished, indican no excess, blood bulk of sediment, pus few corpuscles, mucus slight excess, casts, negative. Epithelia probably ureter in clumps and bladder, no tubercle bacilli present.

Remarks: Suggests stone in the ureter or bladder.

September 26th. X-ray by Dr. Gray shows a small stone about the size of head of a match in the left ureter about four inches from the ureteral mouth. (See Fig. 4, case 5.)

October 13th under chloroform anæsthesia whirlpools of reddish clouds observed emitting from left ureteral mouth which could not be distinctly seen on account of the red medium. With much difficulty the ureter was catheterized, no obstruction or impediment noted, the catheter inserted to the pelvis of the kidney which, with the ureter, was flushed out with a warm boric acid solution and adrenalin 1:20,000.

October 16th. Urine still stained with blood, but patient felt better and allowed to go home.

October 24th. No blood in the urine now, up three times during the night and about every three hours during the day, felt sore from instrumentation, but much better otherwise.

November 1st. Another X-ray by Dr. Gray showed no stone or shadow.

November 6th. Got up once during night and urinated six times during the day. Soreness from the catheterizing cystoscope practically gone, felt better than at any time since trouble began; has gained in flesh and returned to work.

Remarks: This man strained all urine through cheese cloth, since leaving the hospital to the present time and there has never been any debris or grit suggestive of stone. It may have been expelled and lost during his stay in the hospital. There seems to be no evidence of its presence now.

CASE 6. October 31, 1910, referred by Dr. W. S. Robinson of Danville, Va. W. G. P., age 35, single. Three years ago had attack of severe pain in the region of the right kidney. Seven months ago had a similar attack on left side. Has had slight attacks very frequently and has constantly a soreness in the region of the bladder. Does not urinate very frequently but has noticed blood in the urine on numerous occasions.

Examination. Stout, pasty, unhealthy looking man, kidneys not palpable, no pain on pressure over region of kidneys or along the ureter. X-ray by Dr. Gray showed *three* shadows on right side and *two* on the left, about the location of the ureter at the ischial spine, but on account of the *penumbra* and the rather external position were thought to be most likely phleboliths or calcified glands. (See Fig. 5, case 6.)

Cystoscopy. Bladder, large capacity 20 ounces, mucosa perfectly healthy, right ureteral mouth normal. Left ureteral mouth *slightly* injected not edematous or pouting. Diagnosis of stone cannot be confirmed from the appearance and condition of this mouth. Left ureter easily entered with No. 8, the catheter going readily to the renal pelvis without pain or discomfort. Examination of specimen by Dr. E. G. Hopkins. Light amber, cloudy, alkaline, albumen abundant, no sugar, chlorides normal, indican no excess. Blood considerable proportion, pus few corpuscles, mucus no excess, crystals calcium phosphate considerable, amorphous matter, granular debris. Casts, fine granular few, coarse granular abundant, brown granular few. Epithelia renal tubules and ureter abundant. Diagnosis: Chronic diffuse nephritis.

Remarks: We state above that the catheter goes to the pelvis without pain or discomfort. Catheterization of the normal ureter is absolutely non-painful and in a large number of instances, the patient is unaware of the instant when the catheter goes in the ureteral mouth. In other instances it may be likened to the slight discomfort experienced by a urethral catheter crowding its way through the external sphincter. If actual pain is elicited at any point along the course of the ureter, we are immediately suspicious of stone, stricture, or ulceration at that point.

CASE 7. February 10, 1907, L. G., age 20, for several years has had frequency of urination, getting up at night three to four times, and every hour or so during the day. This is in a measure due to large quantities of water which are taken daily as he has found out that the soreness and discomfort in the left side is relieved considerably by this treatment. Three weeks ago he had a severe attack of pain in the left side which required morphine hypodermically. At the time of the attack he made no water and did not for several hours following. Has never noticed any blood in the urine nor has he seen or felt any gritty particles.

Examination. A tall, thin boy, no tenderness over the left kidney, which cannot be felt. Tenderness elicited on pressure over region of the ureter where it crosses the iliac artery.

Cystoscopy. Bladder capacity large. Right ureteral mouth normal, left ureteral mouth edematous and puffy, white concentric ring of congested mucosa about the orifice. On catheterization of left ureter the catheter is abruptly stopped about 4½ inches from the os. On trying to shove the catheter further up the ureter the pain is so great that the procedure has to be abandoned. No X-ray taken.

Urinalysis shows some red blood cells, pus, and epithelia of the caudate variety. Patient is sent to hospital for operation. Two nights later, after being prepared for operation, with cathartics, high hot enema and encouraged to drink large quantities of water, he was seized with an exceedingly sharp lancinating pain which continued for 30 minutes, stopping as suddenly as it began. The next morning the stone, approximately 11 F. in caliber, was voided in a vessel after some little straining and bearing down. (See Fig. 6, case 7.)

Newman (31) reports a similar case.

In this instance the diagnosis was made essentially from the history and impassable ureteral obstruction and the appearance of the ureteral mouth. The attempted catheterization so disturbed the stone's position that increased urinary function, catharsis, and high enema paved the way for its expulsion. It hardly seems possible that a stone of such a size could escape through the ureteral orifice and along the entire course of the urethral canal without becoming arrested. Young reports a case of stone impacted in the intravesical portion of the ureter ulcerating its way through and falling into the bladder, the patient making a perfect recovery.

CASE 8. September 22, 1910, J. F., age 40, married, traveling man (referred by Dr. E. C. Fisher to Dr. H. S. MacLean and the writer). In December, 1908, contracted a bad cold, confined to bed for three weeks with suppression of urine and pain about the left kidney. Later got back to work although not feeling well, pain continuing in the left side and flank and radiating to the testicles.

Fig. 3. Case 4. (Woman.) This stone was positively located by the X-ray and the ureteral sound. Right side.

Recently the attacks of pain have been so severe and frequent that he decided to go to the hospital and have something done.

He has frequently noticed clots in the urine and also that riding and driving aggravated the trouble.

Examination. A big, anemic man, pain over left kidney, no tumor felt.

Urinalysis, 1026 a. c., no casts, some pus and red blood corpuscles, no crystals. Three X-ray exposures negative.

September 24th. Cystoscopy, bladder capacity 14 ounces. Right ureteral mouth normal, left ureteral mouth normal. Ureters not catheterized on account of shock and pain. Phenolsulphonethalein test 1st hour 37 per cent, second hour 17 per cent.

September 29th. Left lumbar nephrotomy, many dense adhesions about the pelvis, a stone is felt in the pelvis. Incision was made along the convex border of the kidney and the finger thrust through into the pelvis which was found to be empty. The external finger felt the stone, however, and shoved it up into the pelvis proper, it having been lying in a pocket or diverticulum of the proximal end of the ureter (see diagram figure). Removed through substance of kidney, mattress sutures, stone proved to be pure fibrin showing no nucleus on examination, consequently throwing no shadow. (See Fig. 7, case 8.)

December 1st. The patient has been home for a month and is enjoying greater relief than he has had since the trouble began two years ago.

This case is of great interest. The attack in December, 1908, was evidently an acute hæmorrhagic nephritis, the agglutination of the fibrin giving rise later to stone simulation. How this concretion, by its very light weight and smooth surface, bulged out the upper end of the unyielding ureter, can only be conjectured.

1. By traction diverticulum.
2. Congenital weakness.
3. Ureteral stenosis.

The anatomy of the ureter will bear on our discussion and some of the more important features will be discussed now.

The ureter 12 to 13 inches long and 4 to 5 mm. in diameter, courses vertically in its paravertebral bed on the psoas muscle, from the lower level of the first lumbar to the sacroiliac articulation, to which it runs parallel anteriorly. It now seeks the level of the ischial spine, bends inward and downward and empties into the bladder about one inch and a half distant from its fellow of the opposite side; its mouth protected by a closely woven reduplication of the muscular wall of the bladder, effectively prevents, except in instances of replacement fibrosis, the regurgitation of all vesical fluids. The arterial supply is most generous. Sampson has shown that the ureter may be dissected out from the kidney above to the bladder wall below, and suffers no necrosis by virtue of this intimate and kindly intramural inosculation. According to Leonard, this explains also how a stone may be impacted in the ureter for months or years causing no erosion or disintegration of its walls. The normal caliber though 4 to 5 mm. has three points of anatomic stenosis.

1. At that point where the pelvis of the kidney becomes the ureter, averaging one-twelfth of an inch in diameter.

2. The point of crossing the iliac artery, averaging one-seventh of an inch.

3. The opening of the ureter in the vesical wall, averaging one-tenth of an inch.

Thus we note that nature's tightest barrier is the first stenosis one-twelfth inch. Freyer (14) states that clinically stone is arrested first at a point two inches from the commencement of the ureter, second at the brim of the pelvis, and third at the vesical end of the

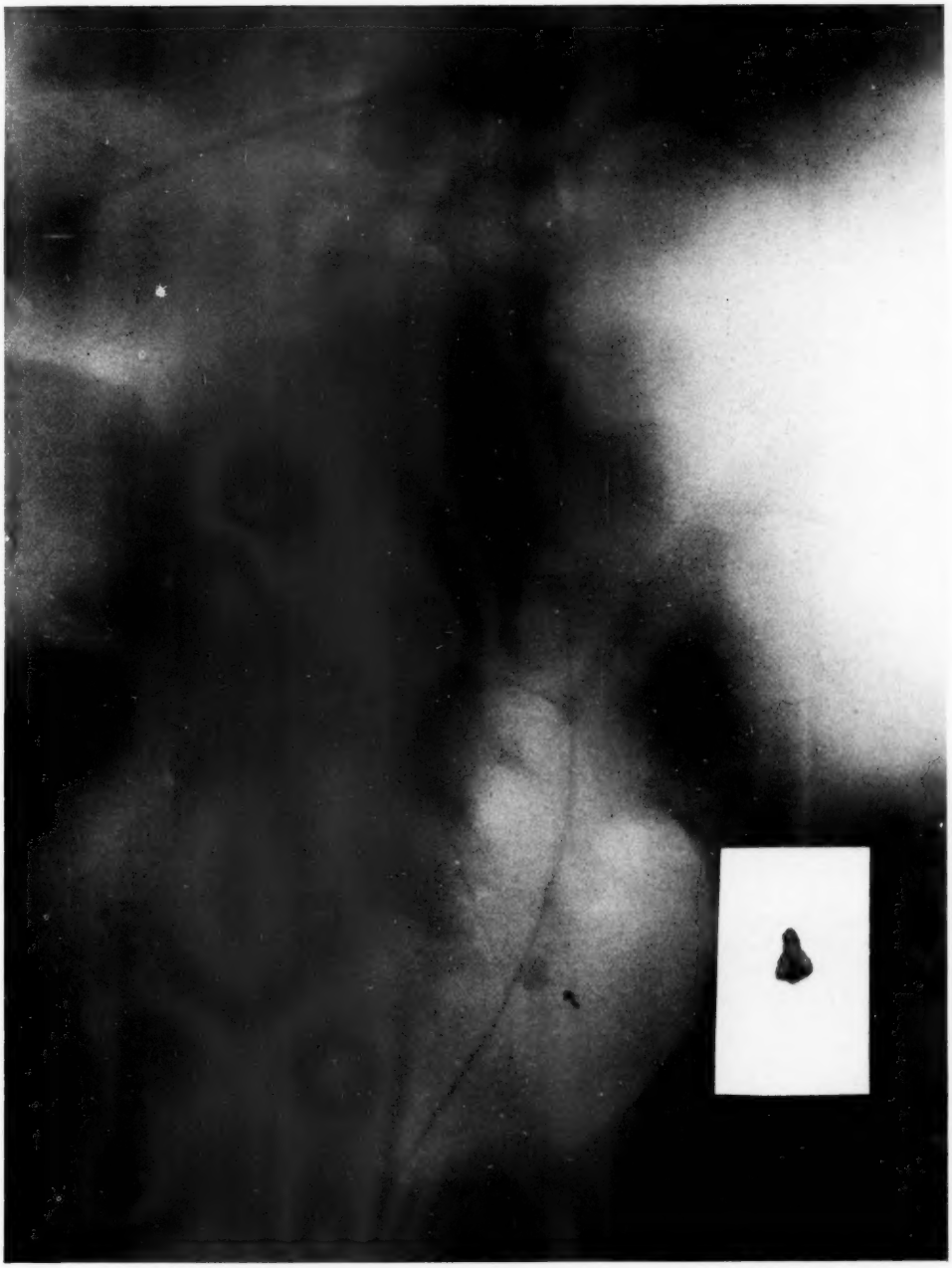

Fig. 3. Case 4. (Woman.) Ureteral stylet tangent to stone. The stylet on the left side goes only 5 or 6 inches. Right side.

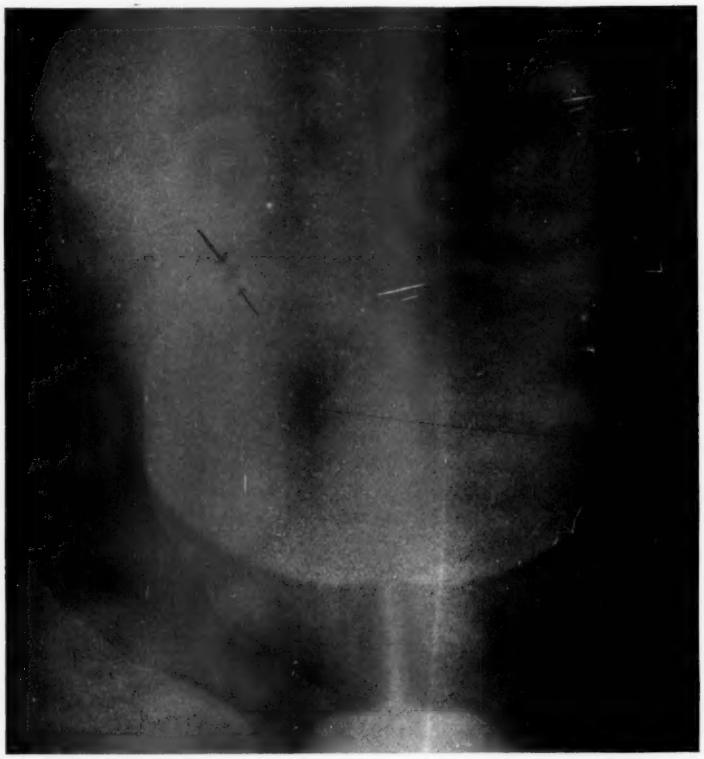

Fig. 4. Case 5. (Man.) This stone dislodged by the ureteral catheter and later voided. Left side.

canal. Schenk (34) tabulates 84 operative cases, in 81 of which the position of the stone was found cited. In 19 (23.4 per cent) the calculus was located within 6 cm. of the kidney, in 8 (9.8 per cent) at or near the pelvic brim; while 41 (50.6 per cent) were found within 5 cm. of the vesical opening, leaving but 16.2 per cent for all other locations. Moschwitz (29) finds the same occurrence of impaction. Fenwick (10) says that stones are frequently arrested in the ureter in the upper portion, and with about equal frequency in the middle and vesical portions.

If the stone slips through this first physiologic contracture, unless its descent is very slow, its size much aggravated by crystals and mucous shreds, it should descend to the vesical mouth where good fortune expels it into the cavity of the bladder, or, on being arrested in the ureter, it gives rise to a train of clinical symptoms not unlike stone in the kidney or in the bladder. Between these constrictions the lumen is dilated, dilatations and constrictions are complementary and instanced in every mucous tube of the body.

The nerve reward is also highly indulgent. Byron Robinson has shown that there are three points of rich anastamosis.

1. Where the plexus ureteris and the ovarian or spermatic coalesce, explaining by irritation, ovarian pain, retraction of the testicle, and also that intolerable itching in the glans penis.

2. Where the plexus ureteris and plexus uterinæ solidify, explaining uterine and vesical disturbances.

3. Where the plexus ureteris and that covering the iliac artery unite, which on

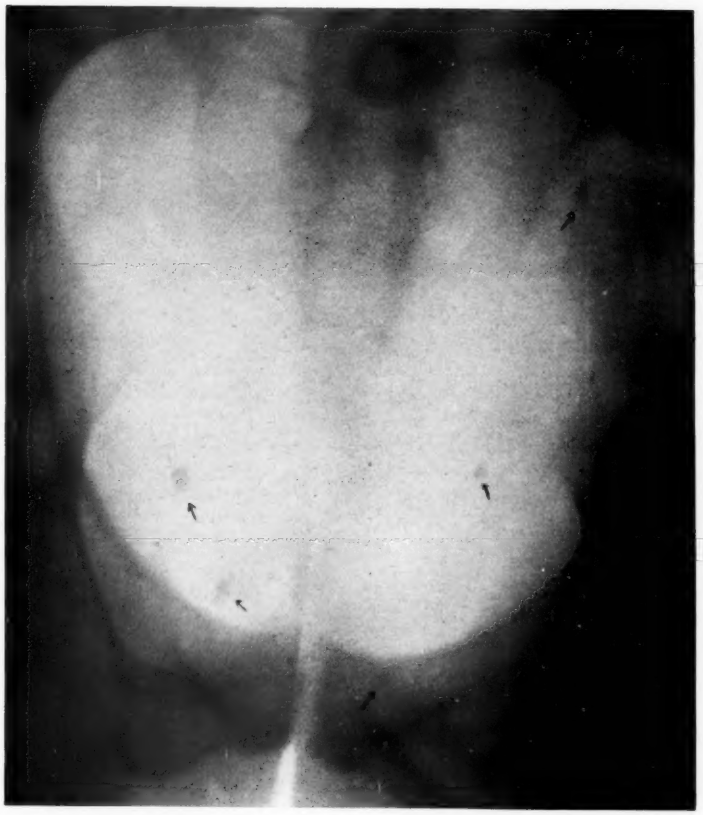

Fig. 5. Case 6. (Man.) The shadows in this case simulate strongly stone but on account of the external position and the penumbra were pronounced phleboliths.

irritation accounts for the referred pain in the knee and thigh.

The formation, retention, detection, and removal of stone from the kidney has long since been perfected, as also has been stone in the bladder. That a calculus formed in the kidney may slip into the ureter and remaining there give rise to abdominal crises, paroxysmal outbursts, and profound constitutional upheavals through years without detection, or even suspicion, has been unfortunately only too frequently instanced. If the kidney is the originator of all ureteral stones, why is it that we so frequently find only one stone? According to Leonard (21) calculus in the ureter is more frequent than renal stone in the proportion of 3 to 2.

ETIOLOGY AND PATHOLOGY

The ureter is an extraperitoneal vertical tube, it possesses only a linear mesentery, is constantly undergoing its rhythmical peristaltic contraction, and on account of its proximity to the intestines, crossed by the ileum on the right and that large cesspool, the caput coli, but a little to its outer side, and behind the sigmoid, on the left, the possibilities of transmural bacillary infection must be considered as a constant menace to the ureteral integrity, particularly if its mucosa has been insulted by the frequent passage of a concentrated urine loaded with irritating crystals such as oxalate of lime, or if indeed its wall has either mechanically or by processes of inflammation been re-

Fig. 6. Case 7. This stone dislodged by the ureteral catheter and later voided.

stricted or damaged, as may be instanced in childbirth, appendical, ovarian, tubal, and peritoneal exudates, and consequent fibrotic replacements.

Ureteral stone may be any size. Bovée removed one 2¾ by 1¾ by 1½ inches successfully.

Males are more frequently the victims than females, according to Morris (27) in the proportion of two to one. This may be explained in a measure by the anatomical difference in the urethra, between the sexes.

The right side seems to be more frequently affected than the left, this obtaining particularly in women. May this be explained by the preteratural mobility of the right kidney, the traction of the nephrocolic ligament of Longyear, the consequent angulation of the renal vessels, increased blood pressure, enfeebled capillary circulation, and minute kidney hæmorrhages? In our series one stone

Fig. 8. Case 9. To illustrate the tolerance of a clean pelvis to stone. Stone snugly filling pelvis of the kidney and upper outlet of the ureter, never giving rise to any pain.

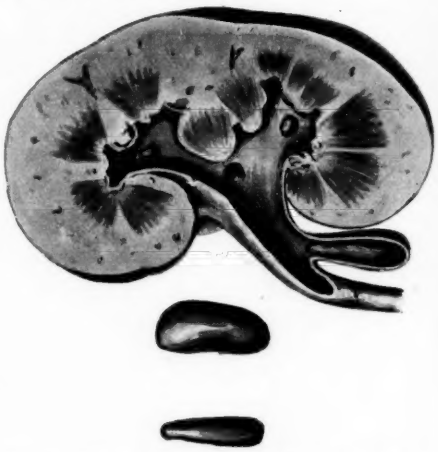

Fig. 7. Case 8. (Man.) Diverticulum of the ureter filled with a stone of pure fibrin, no nucleus.

was found on the right side, that, in the only woman, the remainder on the left.

The determining cause in stone formation is a precipitation of crystals. The character of the food, metabolic changes, occupation, and habits predispose to their crystallization. Microscopic at first, the exciting cause continues and the minute calculus grows. It may now escape through the urinary channels with no symptoms. Its increase in size is slow, its presence is unknown, now and then it engages in the ureter, giving rise to kidney colic. At some time, because of its further intromission, irregularity, and sharp angles, it becomes incarcerated; inflammation, reaction, and swelling of the mucosa ensues, which causes a thickening and rigidity of the ureteral walls with the production of a pathologic stenosis at that point, and that profound train of symptoms is initiated which constitutes "stone in the ureter." Or the ureter is distorted and kinked by a dislocated kidney and general visceroptosis with the consequent traction of mesenteric dislodgment (for it might be recalled that the mesenteric attachment posteriorly is linear, and runs from the left margin of the second lumbar vertebra to the right iliac fossa). It thus crosses both ureters, produces an elongation and stretching of its cross fibers, and weakens the normal support which the ureter has

anteriorly. A weakened wall, bulging or traction diverticulum results, which catching crystal laden urine, cell detritus, and later inviting infection, gives rise to primary stone formation.

Kelly reports a stone originating primarily in the ureter about a silk ligature.

The intra-abdominal pathological lesions which can by virtue of inflammation have a direct influence upon, or jeopardize the normal physiological activity of the ureter are necessarily numerous, too numerous to take up in detail. They are all based upon the same principle, that of an organized exudate which on contraction presses upon or drags the ureter out of its normal bed, and thus interferes with its healthy behavior.

As another and more recently developed causation of primary ureteral stone, must be mentioned *stricture*. The acquired variety has been briefly mentioned above. In regard to the *congenital*, Bottomley (Annals of Surgery, vol. 52) records 56 cases of congenital stricture of the ureter. Such a stenosis, if complete, would result in atrophy of the kidney or hydronephrosis. If of small caliber there would be proximally a dilatation and thickening of the ureteral wall. The opportunity here, through stagnation, for stone building would seem evident and is directly comparable to stone formation in a bladder behind an obstructing prostate.

SYMPTOMS AND DIAGNOSIS

There are many cases of renal calculi which give no symptoms (case 9, Fig. 8) the condition being recognized only at autopsy.

CASE 9. The following case is to illustrate this point: R. E. C., age 26, single, clerk (patient Dr. S. N. Michaux, by whom courtesy of history is given). In September, 1908, had some *discomfort* in right side. From then to September, 1909, has never had any seizure or even pain, but was constantly conscious that he "was not right under the ribs." The urine scalded and burned some, palpation over the kidney was painful. X-ray positive, nephrotomy gave stone, an accurate cast of the pelvis and ureteral outlet.

It is worthy of note here that in the one year's history of this stone's growth to the point where it seemed to fill completely the renal pelvis proper and the upper outlet of the ureter, there was never any colic or abdominal outbursts, and in the absence of infection the pelvis had established a tolerance.

Again we must bear in mind that stone may arise in a diseased as well as in a healthy kidney. In this event there may be present distress and pain from the renal lesion as well as that which is caused by the presence of the stone itself. It is not our intention to dwell upon surgical kidney, perinephritic abscess, and the constitutional manifestations caused by renal suppuration complicated by stone, but to limit our remarks only to stone as found in the ureter arising there *de novo* or manufactured above in a kidney, whether it be healthy or diseased.

Microscopic findings of a pathologic kidney then, must not be confounded as a concomitant phenomenon, or significant of ureteral calculi, for renal epithelium even under favorable auspices is difficult to differentiate from that of the ureter. Casts are significant of kidney lesion, not ureter; blood and pus may come from either. Repeated, painstaking, and deliberate urinalyses should be most carefully carried out. The constant presence of cellular elements, crystals, blood and pus cells, in the absence of renal products and negative bladder findings, should put us on our guard. For there is no one factor that is positive of stone. It requires a minute dissection of an obscure history, one complicated by abdominal neuroses, paroxysmal outbursts of pain in almost any quadrant of the abdomen, and a peculiar obsessive apathy on the part of the patient, to give any direct clue to the cause of the trouble. Many operations for appendicitis have left the offending stone behind in the kidney or ureter to give rise subsequently to renewed attacks.

The writer would emphasize here again that stone may be carried indefinitely in a healthy pelvis or ureter giving rise to no symptoms. At that physiologic instant, however, when by virtue of shifting its position in the pelvis, acting as a ball valve, the stone produces a kidney block, a train of symptoms are brought forth, the more prominent of which is pain. This pain can neither theoretically nor practically be differentiated from the pain of

incarcerated stone in the ureter, for in both instances the onset, though gradual, rapidly reaches the climax and continues so until the stone shifts its position, relieving the block, or the ureteral wall, tired out by its muscular effort, relaxes, allowing a temporary respite. In both instances the pain is intense and most severe, referred to the kidney region, the pit of the stomach, about the bladder, or courses along the ureter. In both there may be a renorenal reflex with consequent anuria. In both, temporary hydronephrosis may supervene, and in both the trauma and reactionary hyperemia give rise to hematuria.

Fenger (9) says "pain with stone in the ureter is not characteristic as the same fixed pain is found in nephrolithiasis, pyelonephritis, and neuroses. Pain may be absent entirely and in some cases no symptoms of stone in the ureter have been present until dilatation of the pelvis, and cystonephrosis, develops."

The patient is profoundly prostrated by the seizure, which continues from a few minutes to several hours (case 4). These attacks may come on frequently or not in months. There seems to be no rhyme or reason for their outbursts.

Stone once engaged in the ureter, tends by gravity and hydrostatic pressure from behind to gain the bladder. Its progress downward is usually slow. Hagner reports a case of an excursion as far as the vesical segment, taking 26 years. Young reports one taking 56 years. If the ureter is not blocked the excreted urine acts as a fluid wedge and helps in its passage. If there is complete blocking, atrophy of the kidney occurs, the stone remaining *in situ* probably later to break through the ureteral wall. The writer, however, knows of no such case. In case 1 there was seemingly a complete block, the stone being densely wedged in the ureter. The kidney, however, was secreting normally and did not appear to suffer in the least from this distal resistance. When once the stone has moved on, the ureter remains dilated proximally to the stone. Its walls weakened by this internal pressure allowing the stone to pass along are now kept in this bulged out condition by the urine dammed back behind the stone.

When the stone comes in contact with the various plexuses along the course of the ureter, new and independent pains arise, which are referred to the ovary, glans penis, testicles, knees. The pain of the stone itself is that produced by pressure on the ureteral wall, the pain of tension. It is also dependent upon the composition of the stone, the oxalate of lime appearing to produce the worst attacks and uric acid the least severe.

It is in the transmission of the stone also that occasional anuria may arise. This is due to transient "kidney block" with a renorenal paresis. It would seem that a very keen dissection of a suitable case could furnish us sufficient clues to allow a venture of diagnosis where the stone would be found at operation, for it is at the pelvic brim that the irritation of the iliac plexus gives rise to the referred pain in the knee and thigh. In the lower segment the vesical disturbances now become more marked and there is a frequent and annoying pollakiuria. This is produced in two ways: by ureterovesical irritation and by a ureterorenal stimulation, vasomotor disturbances with consequent greater output.

Were a stone to be of such size as to pass from the kidney to the outer world giving rise to no pain, there doubtless also would be no blood to be found even on microscopic examination. A stone large enough to produce pain is also large enough to lacerate and injure the ureteral mucosa. Hematuria, then, is a symptom which we constantly expect to find present. And its intermittent appearance would seem to be directly dependent upon the roughness of the stone and its changing position in its progress downward. With laceration and pressure necrosis, pus cells now put in their appearance, the stone passes on from this inflamed area, which heals over and the pus disappears from the urine. Minute particles of the stone are constantly swept away and show themselves as crystals recognizable by the microscope.

With the pelvic congestion of the menstrual period we would expect an increased hematuria. This seems to obtain. We may classify then the three cardinal subjective symptoms as 1, urinary disturbances, anuria and pollakiuria, 2, hematuria, 3, pain. Two or all of these

may be present, two absent, one must be present. In our series pain was found to be complained of most frequently, then the frequency of urination, and lastly hematuria.

Bovée calls attention to a peculiar gait that indicates a desire to keep the psoas muscle relaxed. Meltzer's sign of pain on hyperextension of the thigh is based on the above principle. The stamping test of Lucas may be of value in doubtful cases. The percussion test of Lloyd (24) which produces pain by giving a sharp blow over the region of the kidney is of questionable mention here. Dittel's crises should also be borne in mind as a significant diagnostic measure.

Lloyd (24) calls attention also to the fact that exercise increases the pain of renal stone but does not increase the pain of ureteral stone.

Stone in the ureter can be palpated, per rectum, vagina, or through the abdominal wall, only when of enormous size (Bovée's case), or is favorably located. Nor can we determine the site of the stone even if pressure be made directly over it. The pain elicited may be referred to the kidney, to the bladder, or to the thigh. Obviously palpation for these small incrustations is of negative value.

By 1, urinalysis, 2, cystoscopy, 3, ureteral catheterization, and 4, X-ray, we possess the most reliable measures, one or all of which may lead us definitely to localize or determine the presence of stone.

1. *Urinalysis.* Necessarily the character of the urine will be dependent on the degree of obstruction, whether complete or incomplete, upon its being unilateral or bilateral, and upon the health or diseased state of the kidney above. Lloyd (24) states that when the ureter is only partially blocked, the urine secreted is of low specific gravity, poor in urea, and does not contain albumen. The constant presence of pus is highly significant. This has already been referred to.

In case 1 there was at operation an apparent complete obstruction. The urine was negative as to stone findings.

It is with great difficulty that the epithelial lining of the upper urinary tract can be segregated microscopically, for the epithelium from the pelvis of the kidney and that of the ureter are histologically identical. The difference in their size only, determines their former location. It may be roughly stated that there is a progressive increase in size in the epithelium from the convoluted tubules above to the bladder below, that of the ureter being double the former and one-half the size of the latter.

The constant presence of the larger numbers of epithelia allows us to venture a definite idea as to their former position. The appearance of crystals cannot be considered so significant. They are necessarily transitory and claim no great diagnostic feature. Frequent and numerous examinations must be made, for it is evident that the urine leaking by a stone which has caused a transitory hydronephrosis carries with it cellular elements which did not present when the urinalysis was represented by the healthy side. Again, the plugging may have occurred in the ureter of the working kidney, the diseased organ of the opposite side giving off its products for examination.

It is to catch the stone unawares, in all phases and times of its journey, and its influences upon the kidney and ureter, that the importance of repeated urinalyses is so emphatically brought out.

The constant presence of microscopic blood, pus cells, and epithelia, or their varying constancy, one being prominent at one time and one at another, but all being found on repeated examinations, would, at least, in the absence of other clinical signs, give a clue to the possible cause of the patient's distress.

2. *Cystoscopy.* By this procedure stone in the bladder may be immediately eliminated or confirmed as the source of the trouble. A stone caught in the ureteral mouth is plainly seen and may be wormed into the bladder by one of the many operating cystoscopes. The writer would take this opportunity to call attention to the appearance of the ureteral outlet into the bladder in conditions of ureteral stone. In our series of cases where the stone lay below or at the brim of the pelvis, in each instance, there was a distinct pathological appearance of the ureteral mouth, produced by the pressure of the stone above,

upon the venous and arterial radicles, causing an edema, puffiness, stasis which was decisively apparent by contrasting with its fellow of the opposite side. The ureteral mouth seemed more open, larger, the dimple elevated and pouting, crater-like, the periphery blanched and fluffy. In a case recently operated upon for stone in the kidney, this same condition obtained at the ureteral mouth. The writer believes this is unusual, however. The appearance of the mouth in ureteral block must not be confounded with that of an ureteritis, or one initiated by a pyelitis or pus kidney above, for in this latter, the os is red and turgid, the small radiating vessels are swollen and congested, and the fissure seems more slit-like and not everted or crater-like.

Again by cystoscopy blood, pus, debris, and mucous shreds may be seen emitting now and then. The significance of this feature is evident. With the instrument *in situ* we are not prepared to carry out.

3. *Ureteral catheterization.* The writer has had no experience with wax-tipped bougies. They would seem to be of value in certain cases. With the customary ureteral catheter 7 or 8 F., the mouth is readily entered. There is no pain or discomfort experienced until the stone is struck; dislodging it bruises the mucosa, and the pain, intense and sharp (in our series) was constantly referred to the kidney. Were a stylet to be used the catheter might easily be shoved through the ureteral wall at that weakened dilatation, distal to the point of the stone's arrest, this method therefore should be condemned. If the stone lies as a ball valve, the catheter may readily get by it, gaining the kidney, thus deceiving the operator. If firmly arrested (incarcerated) the catheter cannot get by, the resistance offered is evident, for the catheter straightens out the ureter and now doubles in the bladder. If this occurs the catheter should be removed, and the operation done over again to assure one's self of no faulty technique. The olivary tipped catheter would more likely find its way through a stricture of the ureter. If stricture is the cause of arrest, the pain brought out by attempted sounding is of a different character from that caused by dislodging a stone. It is not so severe or immediate, and the resistance offered the catheter does not appear so abrupt.

It is while the catheter is being retained that the phenolsulphonethalein test may be employed to determine the functional activity of the kidneys and their ability to stand operation.

4. *In the X-ray* we possess the most reliable, means of diagnosis for ureteral calculi. The peculiar value of this method is positive as well as negative.

Aside from recording the number, size, shape, and location of the stone on the affected side, the unsuspected kidney and ureter are likewise shown up, for stones are not infrequently bilateral.

The reliability of the X-ray in the hands of the skilled operator cannot be gainsaid. When this method does fail (which must occur in a certain percentage of cases) it may be traced more to physical laws than to a negative value of this measure.

Stone weight determines the shadow. The most distinct is that of the oxalate of lime. This shadow is deeper than bone tissue. Phosphate of lime calculi are next in depth of shadow, and pure uric acid crystals, which constitute a fair percentage of all cases, throw a very slight or no shadow at all. It is with this type of stone that the error in interpretation has largely arisen. In our series the X-ray was negative in two instances (cases 8 and 2). Case 8 showed a fibrinous cast of the diverticulum which, having no nucleus, could throw no shadow. The technique was the same, physical laws were such that the impossible could not happen.

According to Leonard (23) the Roentgen method includes less than 3 per cent of error, this representing indeed the discovered error.

The skilled operator will not confound the shadow obtained, with appendoliths, enteroliths, calcified glands, phleboliths, calcareous deposits in the iliac artery, sesamoid bone in the tendon of the obturator internus, bony spurs, etc., for, if in doubt, another X-ray with the ureteral stylet or leaded catheter may be employed to determine the accurate location of the suspected stone. When stone is suspected in the pelvic portion of the ureter,

the patient should be skiagraphed in a sitting posture. This does away with the bony background of the sacrum, a frequent source of misinterpretation. Dodd of Boston and Gray of Richmond have called attention to this.

"The Roentgen rays have given many unexpected revelations" (Rovsing, 32).

Although a diagnosis of ureteral stone might be pretty accurately brought out by urinalysis, cystoscopy, and ureteral catheterization, aside from the clinical symptoms, a method which offers such positive claims and results, so economical, mechanical, and determining in its value as the X-ray, cannot be given a minor place or undue consideration in those cases of even suspected stone.

In negative findings, exploratory operation is not precluded. In positive findings it determines us, how and where to operate.

	Ureteral Stone	Appendicitis
Age	Constantly in 2d, 3d decades	Any age
Sex	More frequent in male	More frequent in male
Occupation	Sedentary	No influence
Pain — Onset	Ultra-acute reaches climax in 5 minutes	Subacute, reaches clim. 2–4 h.
Pain — Location	Urogenital: kidney, bladder	Abdominal, epigastric, focal
Pain — Duration	2–4 hours, rarely longer	12–14 hours, probably longer
Temperature	Normal, subnormal	Normal, elevated
Pulse	Much accelerated, soon drops	Moderately accel. more so
Urinary disturbance	Anuria, hematuria, pollakiuria	None
Vomiting	Of shock	Splanchnic disturbances
Belly wall, right rectus	May be rigid on right	Rigid
Right thigh	Flexed if on right	Flexed
Bowels: Stone in pelvic part	Tenesmus, constipation	Constipation
Palpation over appendix	Not painful	Painful
Urinalysis	Blood, pus, crystals	Nothing significant
Blood count	Normal	Elevated
Termination	Gets rapidly better	Grows slowly better or worse

DIFFERENTIAL DIAGNOSIS

The clinical symptoms of ureteral stone are essentially those of long standing chronic discomfort with ultra-acute exacerbations, agonizing and distinctly urogenital pain, and characterized by urinary disturbances, anuria, pollakiuria, or hematuria. Few intra-abdominal surgical conditions arise so abruptly from a clear sky. Gall-stone colic should be eliminated. Bile pigment in the urine in the absence of blood and pus would be significant and leading. Appendicitis could justifiably be confounded with impacted stone in the ureter.

TREATMENT

The size, number, and location of the stone having been accurately determined, the treatment resolves into one of two methods: 1, ureteral catheterization and lavage, 2, operation. It would seem advisable in small stones and those located in the lower segment of the ureter to attempt by ureteral catheterization and injection to dislodge them. This will likely occur in a fair percentage of instances. Cases 2, 3, 5, and 7.

If this method fails operation is indicated. The writer has done only the extraperitoneal. It does not appear that the intraperitoneal or combined methods offer any peculiar advantage which would justify the possibility of peritoneal infection by urine leaking from a suppurating track. An incision starting midway between the highest point of the crest of the ilium and the 11th rib and running to the anterior superior spine of the ilium, thence parallel with and internal to Poupart's ligament for its outer three-fourths, has in our series given sufficient opening to explore the ureter from the kidney above to the bladder below.

In those instances in which the stone is incarcerated in the intravesical segment, the incision may be carried down to the spine of the pubes. This gives all the room desired.

The ureter is cut through its long axis, the stone removed. Catgut sutures approximate the wound, and a tube is inserted to the site. In our series there was leakage in but one case for five days, the remainder giving none at the end of two days.

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DEPARTMENT OF TECHNIQUE

CONSIDERATION OF THE TECHNIQUE OF THE RADICAL ABDOMINAL OPERATION FOR UTERINE CANCER BASED UPON AN EXPERIENCE WITH FORTY-FOUR CASES[1]

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IT is with some hesitancy that I submit a paper dealing with operative technique to a society such as this. My only excuse is that the operation in question is, in my opinion, undeservedly unpopular in this country and a discussion of the whole question may so change surgical opinion as to lead to renewed attempts to master the technique of the operation. I say this advisedly, for I believe the primary mortality of the radical abdominal operation for uterine cancer has been so high as to lead many surgeons to abandon the operation when more perseverance would have so improved their technique as to lead them to continue with the operation. For it takes courage to perform an operation to-day which is apt to give over thirty per cent primary mortality in the first two or three dozen cases. We are not accustomed to such shocking primary results, for modern surgery has been so developed that the ordinary gynecologic clinic proceeds with as much precision as exists in a well regulated machine shop. The occasional death only proves the rule. To undertake an operation entailing under the best conditions a primary mortality of at least ten per cent, and with the inexperienced three or four times as much, is very apt to prove discouraging to the operator and cause him to give up the operation upon one pretext or the other.

At least that was my experience with the advanced radical abdominal operation for uterine cancer. A primary mortality of over forty per cent in fourteen cases is not conducive to the conceit or happiness of any operator. While I have preserved and have been able to bring down my primary mortality figures to a point (15%) where I can disclose them without shame, I still approach each operation of this kind with the greatest respect, for I have learned that things go wrong at the slightest provocation. Hence it has seemed to me fitting to discuss briefly the technique of this operation, which in my opinion is the most difficult in the whole realm of gynecologic surgery.

No claim is made for originality in the technique to be submitted. The principles of the operation were laid down long ago by Ries. Each operator had modified the technique, but there have been no changes of any great importance. The clamping of the vagina prior to the removal of the uterus, for example, a modification introduced by Wertheim, while a valuable addition to the technique is not vital to the successful performance of the operation. The radical abdominal operation for uterine cancer is based upon the principle that there should be a wide removal of the diseased uterus. Vaginal hysterectomy had proved a failure because the surgeon, perforce, had been obliged to place his forceps or ligatures close to the uterus through fear of injury to the ureters. Thus cancerous areas were left behind in the broad ligaments with resulting quick return or rather a rapid continuation of the disease. By the abdominal route it became possible to tie the uterine arteries outside of the ureters, and after dissecting out these ducts, to remove the parametrial tissue up to the pelvic walls. Not only this, but through this avenue of approach the upper portion of the vagina could be safely removed and the pelvic glands excised.

The operation has been sharply criticized on the grounds that its technique is too complicated and the primary mortality too high to warrant the procedure. It has been claimed that it is useless to remove some and not all the pelvic glands; and that since the latter task is impossible it were better to be contented with the safer vaginal hysterectomy. But I have never seen it contended that the basic principle of the

[1] Paper read at the meeting of The Southern Surgical and Gynecological Association, Nashville, Tennessee, December 13–15, 1910.

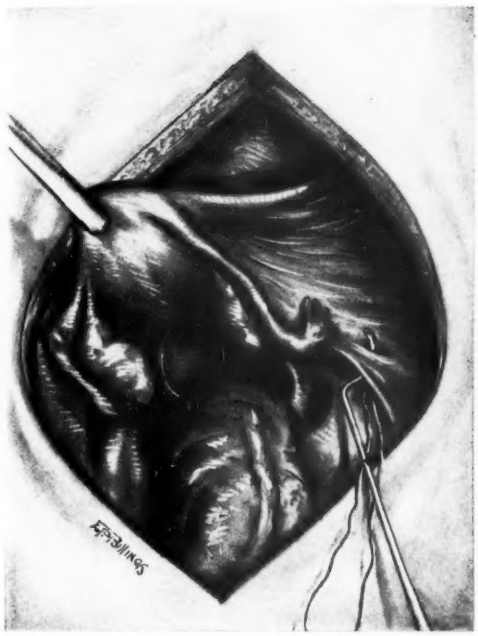


Fig. 1. Extensive abdominal incision in median line from pubes to umbilicus. Uterus drawn sharply to left and ovarian artery tied with catgut well out toward the pelvic wall.

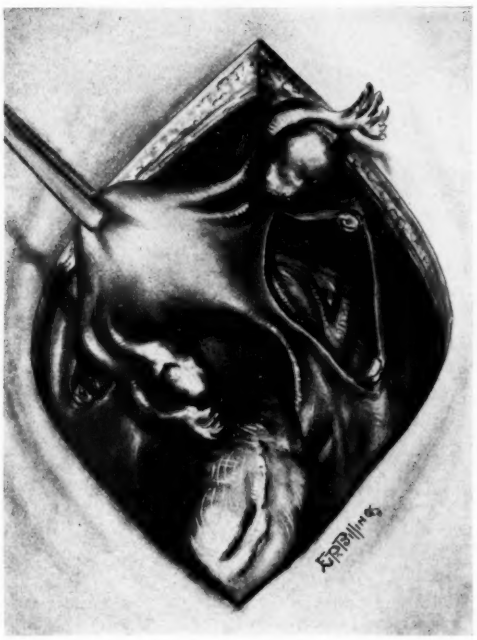


Fig. 2. Ovarian artery and round ligament severed and cut. Opening made between layers of broad ligament so as to expose pelvic vessels and ureter.

operation was at fault; in other words that it would not be desirable to make an extensive removal of the cancerous uterus and its surroundings, if that were possible. To deny this would be to set at naught lessons learned in the surgical treatment of cancer in other parts of the body where wide excision has resulted in permanent cures.

THE TECHNIQUE OF THE RADICAL ABDOMINAL OPERATION FOR UTERINE CANCER

Since the vagina is to be opened from above, it is highly essential that this canal and its contents be made as aseptic as possible. With this end in view the cancerous cervical tissue should be removed by the curette and the oozing surfaces seared over with the cautery. This should be followed by the application of strong bichloride (1-500) or other antiseptic solutions. In most instances this can be done just prior to the abdominal incision. Rarely it may be deemed best, on account of the anemic condition of the patient, where every ounce of blood lost materially lessens the chances of recovery, to first curette and cauterize, the abdominal operation being performed subsequently. While these measures may not secure an aseptic vagina, practically the latter is free enough from germs so that peritonitis may be avoided if care be taken in the subsequent steps of the operation.

The abdominal incision must be of considerable length; usually one reaching from the pubes to the umbilicus will not be found too long for the extensive dissection which must follow. I have found the median abdominal incision will answer all purposes, even in fat women. Extensive transverse incisions are mutilating and unnecessary. It is absolutely necessary for the patient at this stage of the operation to be deeply anæsthetized and while in the exaggerated Trendelenburg position for the intestines to be packed away from the pelvis and held upward by gauze packs. Then the patient can be returned to as nearly a horizontal position as will enable the operator to obtain a good view of the operative field while he continues his work. Elsewhere I have explained my views regarding the danger of the sustained exaggerated Trendelenburg position in this operation. Suffice it to say that

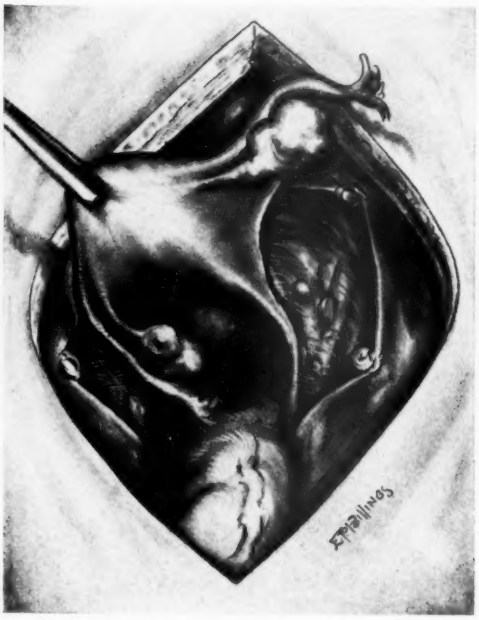


Fig. 3. Peritoneum cut upward to give a better view of ureter and pelvic vessels.

Fig. 4. Vesicouterine fold of peritoneum cut across and bladder pushed well upward in median line. Laterally, vaginal wall should not be exposed until later for fear of venous bleeding.

Fig. 5. Locating the uterine artery by passing forefinger along ureter.

Fig. 6. Uterine artery ligated in two places and severed, thus exposing ureter lying beneath.

Fig. 7. Showing vesical veins running across the lower portion of the ureter. These veins should be seized by hæmostats at either side of the ureter before the ureteral sheath is completely divided; otherwise they will be injured and profuse bleeding will result.

Fig. 8. Showing the bladder pushed well upward. The ureter should be separated by gauze pressure and blunt dissection from the uterus from where it enters the parametrium up to its insertion into the bladder. The vaginal wall should be isolated to such an extent that at least one inch can be removed with the cervix.

for this particular operation it is dangerous and should not be employed.

The uterus is now seized and drawn sharply to one side and the ovarian artery tied with catgut well out toward the pelvic wall (Fig. 1).

The round ligament is tied separately also well away from the uterus. After the opposite side has been treated in a similar manner, an opening is made between the layers of the broad ligament so as to freely expose the pelvic vessels and the ureter (Fig. 2). I see no good reason for exposing the ureter by an incision through the posterior surface of the broad ligament as advocated by Wertheim. The ureter is almost always readily seen at the bottom of the space exposed. If there be any difficulty it is easily recognized by the sense of touch and just as easily isolated. It is not to be dissected out from its peritoneal bed from above downward or else its blood supply may be impaired (Sampson).

With the scissors the peritoneum should now be cut upward nearly to the bifurcation of the iliacs (Fig 3). This further exposes the ureter and enables the operator at this point to make a dissection of the pelvic glands if he so wishes. Personally I prefer to defer the question of the excision of the glands until after the removal of the uterus, for in some instances at this stage of the operation the patient will be in such a serious condition as to lead the operator to abandon glandular dissection. Whether glands should be removed or how extensively are still mooted questions. The uterus and parametria must always be removed.

The uterus is now drawn sharply upward toward the umbilicus and the vesicouterine fold of the peritoneum cut across (Fig. 4). The bladder is now separated from the cervix by gauze and scissors. Care must be taken at this point to expose the vaginal wall only in the median line. An attempt to separate it laterally in the neighborhood of the ureters will usually lead to the opening of large veins and to considerable bleeding.

The uterine artery is usually easily isolated and tied by remembering that it lies above the

Fig. 9. Showing where posterior fold of peritoneum should be severed. Ureter drawn to one side, rectum pushed downward. Sacrouterine ligaments seized with hæmostats; any bleeding controlled in same way.

Fig. 10. Pelvic tissues protected by gauze packs. Bladder drawn upward and ureters to one side. Clamps placed well down on vaginal wall at least one inch away from end of cervix.

ureter. With the latter as a guide the forefinger is passed under the artery which by this procedure is easily separated from the ureter (Fig. 5). The artery should be cut between the two ligatures and the ureter more fully exposed (Fig. 6).

While the ureter has no real sheath in the true sense of the word, the tissues of the broad ligament, especially when indurated, form an artificial sheath about the duct. This sheath should be carefully cut before attempting to dissect away the ureter from its bed in the broad ligament. For this purpose the sharp pointed scissors should be used, the lower blade being inserted along the upper wall of the ureter as it enters the upper edge of the broad ligament (Fig. 7). The ureter should always be isolated by this process toward the bladder, not only because it is handier to work in this direction but because it is easier in this way to clamp the veins which run transversely across the pelvis in the region of the bladder before the ureteral sheath is severed (Fig. 7). This is one of the most important points in the technique, for unless these veins are thus treated there is liable to be profuse bleeding. The operator hesitates to seize the bleeding points for fear of wounding the ureter. The field is obscured with blood and much time may be lost before the hæmorrhage is controlled. This should be secured by firm pressure with gauze packs, meanwhile saving time by working on the other side of the uterus or severing the uterus posteriorly. It now can be readily seen why the bladder should not be fully pushed away laterally until after the ureter has been isolated in the way described.

By gauze pressure the bladder should be dissected well upward and the ureter dissected away from the uterus from a point where it enters the parametrium up to where it enters the bladder (Fig. 8). It will do no harm to dissect out this portion of the ureter freely, provided it is left undisturbed in its upper portion. If it be dissected out from its bed from the brim of the pelvis down to the bladder its blood supply is bound to be interfered with and ureteral necrosis almost invariably follows.

The vaginal wall should be well separated from the surrounding tissues, for it is necessary

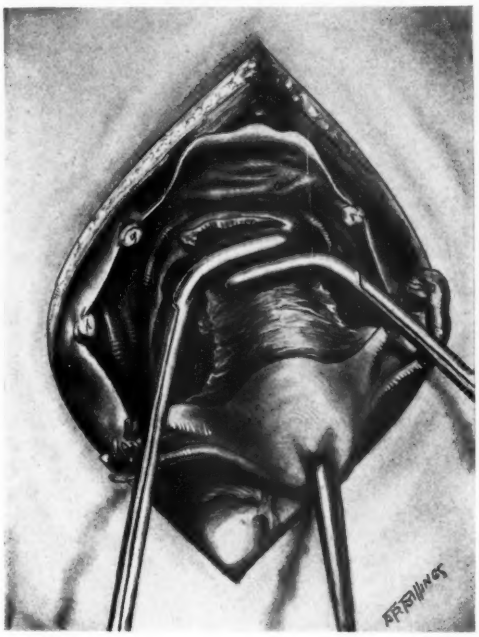


Fig. 11. Vaginal wall cut below clamps. Cut edges seized as wall is cut and pulled upward. Peritoneal soiling from vagina prevented by packing small piece of gauze into amputated vagina from above.

Fig. 12. Vaginal walls whipstitched to control bleeding. Vaginal opening protected with gauze and glandular dissection proceeded with whenever the condition of the patient warrants prolongation of the operation.

that at least one inch of the upper portion of this canal be removed with the cervix.

The uterus should now be drawn toward the pubes and the posterior peritoneum together with the sacrouterine ligaments should be cut across. Any adhesions should be severed and bleeding controlled by forceps. The rectum should be pushed downward by gauze pressure, care also being taken to see that the ureters are away from this posterior fold of peritoneum (Fig. 9). However, it is unnecessary to make any further dissection of the ureter; it merely needs to be drawn strongly to the side of the pelvis to be out of the way of the incision of the posterior peritoneal fold.

Preparatory to cutting across the vagina and removal of the uterus, the surrounding structures should be carefully protected with sterile gauze packs. The vagina should be clamped at least one inch away from the end of the cervix, the assistant pushing away the bladder and drawing aside the ureter.

The vagina should be cut below the clamps (Fig. 11) not between, a much more difficult procedure. As the vagina is opened, the cut edges of its wall are seized with tenaculum forceps and pulled upward and a small strip of gauze packed into opening from above downward to prevent peritoneal soiling from the vagina.

The uterus is removed with the vaginal wall clamped so that the cancerous cervix is shut off and peritoneal soiling is reduced to a minimum. The edges of the abdominal wall are whipstitched to control any bleeding (Fig. 12) and the opening covered with gauze.

If the condition of the patient warrants, the lymph glands should be carefully removed. This can be done by sight as well as touch. I believe this dissection should be as thorough as the condition of the patient warrants. Unquestionably Ries is right when he insists upon the importance of the removal of the pelvic lymphatics. It is a logical, surgical procedure and therefore desirable. The operator, as his experience increases, should work more and more toward extensive glandular removal, for thereby he may be able to save a certain number of one-third of the patients where the glands con-

Fig. 13. Peritoneum sutured in place and all raw surfaces covered. Spaces about iliac vessels drained by small pieces of gauze leading out through vagina.

tain metastases. But in his endeavor to save these patients he must not too greatly jeopardize the remaining two-thirds where the glands are not affected to any great extent, if at all. We must remember that after all more has been gained from a wide removal of the parametrium. This is almost invariably affected and in operable cases wide excision is possible without too much danger. The toilet of the peritoneum is now completed. All oozing is done away with, either by extra catgut sutures or by gauze pressure. With a running catgut suture the peritoneal edges are brought together and the general peritoneal cavity shut off (Fig. 13). Small pieces of gauze leading from the iliac spaces through the vaginal opening will serve for drainage. Occasionally more gauze will be necessary on account of persistent oozing.

The abdominal wall should be closed in layers with retention sutures without drainage.

It is not the purpose of this paper to discuss the various complications which may arise during the course of the operation. These are considered in the more detailed discussions of the technique.

Those desirous of knowing my personal results with the radical abdominal operation are referred to a paper recently published in SURGERY, GYNECOLOGY AND OBSTETRICS, where the figures are given in detail.

OPERATIVE METHOD FOR EXSTROPHY OF BLADDER

WITH REPORT OF A CASE

BY AXEL WERELIUS, M. D., CHICAGO, ILLINOIS

URETEROINTESTINAL implantation on account of the urinary control it confers would be the ideal operation for exstrophy of the bladder were it not for the great danger of ascending infection. This is a constant menace, owing to the continuous passage of intestinal contents past the ureteral openings, the danger becoming still more imminent at times of intestinal affections. In order to somewhat lessen this danger, the formation of an independent pouch for reception of the urine before it enters the intestinal channel proper, could be made as in Fig. 1.

This method would do away with direct fecal contamination of ureteral mouths. Almost the exact condition exists in birds in which a urinary reservoir communicates directly with the gut, urine being passed per rectum; so, in performing this operation, we would only aim to go back to or create conditions existing in lower types of animal life.

The operation is done in two stages:

STAGE ONE

This consists of the formation of an artificial bladder (urodenum). The operative field (left abdominal side), after ordinary preparations, is painted with tincture of iodine and protected from the area of exstrophy by placing an adhesive strap obliquely across the lower abdomen and

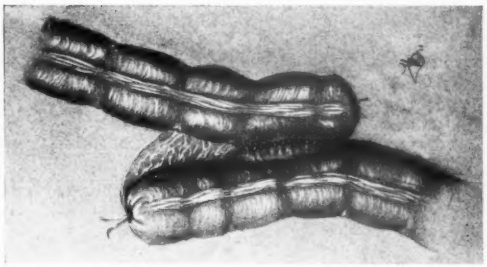


Fig. 1.

over a towel covered with oiled silk, which is then turned over the exposed bladder completely excluding it from the operative field. The patient is then tilted over on his right side to allow the urine to flow away from working area, and also to get the small gut out of the way. An oblique incision is then made in the left inguinal region, much the same as for appendectomy on the opposite side. The sigmoid is delivered through the wound and divided about seven inches above the rectosigmoidal junction and the proximal end anastomosed to the upper part of the rectum, as in Fig. 1, leaving a future artificial bladder about six inches long. Abdomen is closed in usual manner without drain.

STAGE TWO

Step 1. Flap of bladder containing ureters is dissected and all of the bladder mucosa cut away.

Step 2. Through a median abdominal incision the intestinal pouch is exposed and partly delivered through the wound and clamped with rubber-covered forceps. The clamped gut is opened into the lumen. The bladder flap is then approximated to the intestinal opening and sewed to the edge, through and through, as in Fig. 2, with linen. The opposite edge is sewed with a

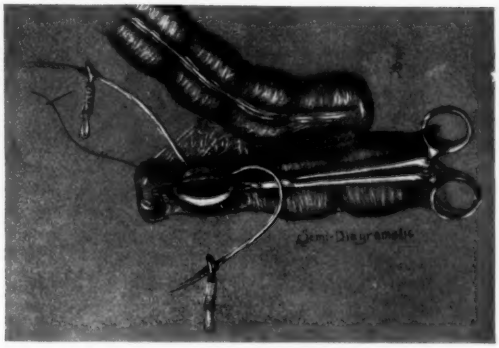


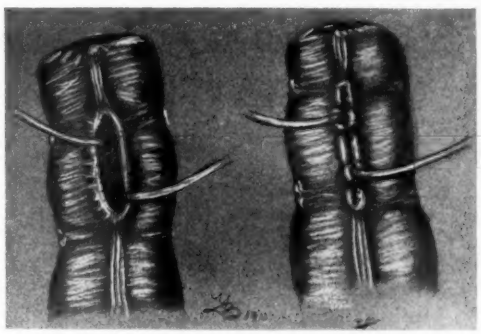
Fig. 2.

Connell stitch, so that, when finished, the gut somewhat overlaps the bladder flap, Fig. 3 (a).

If the intestinal tissue is abundant serosa may be drawn over so as to completely cover the flap, Fig. 3 (b).

Abdomen is closed with gauze drain.

Dr. J. J. Moorhead has operated on a case following this method, which he intends to report later.



a *b*

Fig. 3.

ABDOMINAL EXCLUSION OF THE FUNDUS IN COMPLETE PROCIDENTIA

By JOSEPH RILUS EASTMAN, M. D., Indianapolis, Indiana

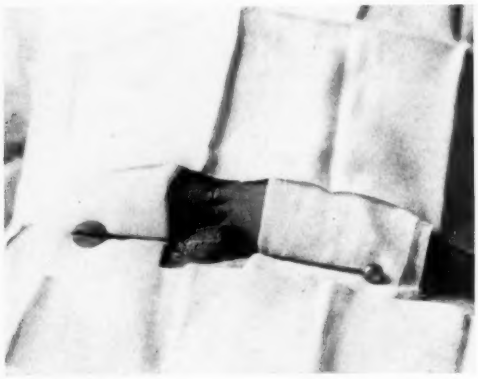
THE question of whether the uterus in its normal state is suspended by its ligaments and thus secured in position or is supported or upheld by the muscles and fasciæ of the pelvic floor, the ligaments serving only as guides, becomes in the presence of complete procidentia a question of lessened importance, for in these extreme cases hysterectomy, or the abdominal operation with fixation, is absolutely necessary in addition to a thorough repair of the vaginal supports with amputation of the elongated portio vaginalis and curettage.

In cases of third degree descensus, with extroversion of the bladder floor and part of the rectum, separation and elevation of the bladder after Schauta or Goffe with attachment of this viscus at a higher point on the floundering, sunken uterus is to little purpose, and if not followed in complete procidentia by abdominal fixation is usually as ineffective as an attempt to lift oneself by one's boot straps.

There is certainly no department of surgery in which care in the selection of the operative procedure to be employed in the particular case is of greater importance.

No doubt as many failures in the treatment of uterine prolapsus are ascribable to error in the selection of the operative method as to faulty technique.

In any case repair of the diastasis of the levatores ani as earnestly advocated by Barret and Jewett and the restoration of the conjoined tendon of the pubococcygei can hardly be omitted. Likewise currettage and amputation of the elongated portio vaginalis apply to any comprehensive procedure which does not include a hysterectomy.



Uterine fundus excluded transfixed at junction with body, the 8-inch transfixing pin remaining in place until healing is firm.

The field of large difference is entered when the manner of sustaining the uterus itself in its normal level and positional relations is considered. It is here that the choice of the proper step for the particular case in hand is an absolute need.

It is evident to any man of any experience in this field of surgery that no one procedure will fit all cases.

Cystohysteropexy, interposition, and ligament operations all doubtless have their usefulness, but in extreme complete procedentia with general relaxation of ligaments, fasciæ, and muscles they do not often suffice in my experience to correct the dysuria and the dragging pains.

In these cases it is not often possible by making a perineorrhaphy, oval anterior denudation of Sims, restoring the fascia after Webster and elevating the bladder floor after Schauta, to successfully protect against the collection of residual urine and the appearance of desquamative cystitis as observed and described by Kolischer.

In a small personal experience with hysterectomy and union of the ends of the broad ligaments, dysuria, and dragging pains have persisted and it has seemed better that the uterus had been left in to the end that I might have something to attach firmly and permanently to the abdominal wall, thus to support the bladder and the rectum. In one instance the persistence of residual urine in the bladder, the "fond" of which still presented folds caused straining so violent as to spoil the result of the operation in every essential detail.

Carstens, who hysterectomizes procedentia cases asks, "Of what use is the uterus if left?" In many cases if the uterus be left it has a use and this usefulness rests in the circumstance that the uterus through its attachments may serve as a means of support to the other pelvic viscera after abdominal fixation.

I have heard ventral fixation called a crime. Perhaps it is before the menopause, yet by drawing the folds out of the bladder trigone and re-establishing the inclination of the normal

bladder base toward the internal meatus, trigonitis and dysuria unchanged by previous plastic operations for the correction of the cystocele have been relieved.

The fixation here referred to is not a classical one by which the fundus is sutured to the abdominal aponeurosis, but one in which the uterine fundus is drawn quite through the abdominal wound, the entire fundus being excluded and secured with a transfixing pin, eight inches long, one-eighth inch in diameter, the ends of which rest upon the skin lateral to the wound. The pin is allowed to remain in place for two and one-half weeks.

It is not a rare experience to find a few months after a simple fixation the abdominal wall sunken in at the site of fixation and the prolapsus returning.

Occasionally a well intentioned fixation gives way entirely.

In extreme procidentia the sagging bladder cannot be held at its normal level by an ordinary fixation.

These are the cases in which Baldy, for example, makes a supravaginal hysterectomy and permanent fixation of the stump by means of two silkworm gut sutures carried through the whole thickness of the cervical stump and buried on the fascia of the abdominal wall.

He says that in two or three such cases after performing this operation the patient has returned with the prolapsus reproduced in part. He then made a complete and total hysterectomy, a sufficient amputation of the vaginal vault, a closure of the vaginal mucous membrane, and a fixation of the vaginal vault to the abdominal wall as close to the pubic bone as possible.

I have the impression that recurrence in such a case may be due to ligament formation at the site of the fixation, and owe this impression to the discovery of elongated, fibrous, ligamentous attachments to the abdominal wall of a cervix stump fixed ventrally years ago after Bantock's supravaginal hysterectomy with extraperitoneal fixation and abdominal exclusion of the stump.

In excluding the fundus in cases of complete procidentia, the aim has been to fix the uterus higher than can be done by an ordinary fixation, to provide for firm attachment of the peritoneum, muscles, and aponeurosis at a low level upon the anterior, posterior, and lateral aspects of the uterine body.

All of the layers of the abdominal coverings are drawn snugly around the uterine body and sutured to that organ anteriorly, posteriorly, and laterally.

The transfixing pin in the three cases operated has been passed deeply enough to exclude the entire fundus. The large pin, an old-fashioned Bantock's "skewer" for extraperitoneal cervix stump fixation does not mutilate as do sutures. It does not tend to cut out as do silk and silkworm gut. It is perhaps barbarous in appearance, but does not lacerate nor produce discomfort.

Two patients thus operated, though they were past fifty years of age had not passed the menopause and in one of these the uterine appendages were removed and in the other the tubes were divided and the peritoneal screen suggested by Ries interposed. In all three cases the abdominal operation was preceded by curettage, amputation of the portio vaginalis, anterior and posterior colporraphy, and perineorraphy.

The results in these cases have been better than I have been able to obtain in similar cases by other methods. There has been no postoperative dysuria, no residual urine, and no return of the prolapsus uteri.

In each case the fundus has been covered over with skin, growing centrally from the periphery within two or three weeks. Owing to the firmness of the attachment and the elevation given by the transfixing pin, the possibility of sagging or detachment is minimized. The method offers the greatest possible uterine surface for fixation in the abdominal coverings.

It makes possible reduction of deformities caused by extreme relaxation as a simple intra-abdominal fixation could not do, for the reason that the uterus is drawn higher and the firmer fixation prevents a yielding ligamentous fixation or a complete sundering of the attached structure, an accident which is perhaps less rare than is imagined.

A possible advantage of abdominal exclusion over intramural sequestration as practised by Philander Harris rests in the fact that the uterus is permitted to maintain more nearly normal positional relations with the other pelvic viscera.

OBSERVATIONS UPON THE OPEN TREATMENT OF FRACTURES[1]

By CHARLES G. LEVISON, M. D., San Francisco, California
Visiting Surgeon to the Mount Zion Hospital

As these remarks will be devoted almost entirely to the open treatment of fractures, the relative merits of the conservative and the operative methods will not be discussed. That this problem is not yet solved is shown by a consideration of Bardenheuer's and Lane's writings.

Bardenheuer claims that almost all fractures can be successfully treated, and that operation is indicated only in the exceptional case. His system of extension and counter extension combined with traction and counter traction, these manipulations being controlled by the frequent employment of the X-ray, makes it possible for him to obtain results that are very convincing, and which are demonstrated by the radiographs that are open to inspection. These methods, however, can only be carried out in well regulated hospitals with excellent X-ray facilities, where the nurses and the house physicians have received special training. The character of the patients must also be taken into consideration, for with any class but the phlegmatic type, this treatment is not feasible, as the numerous cords that are used for traction exact the greatest amount of patience on the part of the sufferer. I have endeavored to employ Bardenheuer's system, but have discarded it on account of the difficulty that has been experienced in meeting the requirements. The principles, however, seem to be founded on a correct mechanical basis and are worthy of serious consideration.

Bardenheuer maintains that exact anatomical apposition is not essential, but that the desideratum is a good functional result; when this can be obtained, operation is not indicated.

As Lane operates upon almost all fractures as soon as they come under his observation, and as his results are such as to convince the most skeptical, conclusions must be confusing, to say the least.

Cotton states in his excellent book that has just appeared, that "accurate reposition is almost never attained except by open operation, but what is important is the obtaining of good functional results."

While certain irreducible fractures have for years been treated by operation, it has only been recently that the open method for the treatment of fractures has been more or less generally accepted, and the thanks of the profession are due to Mr. Lane for his pioneer efforts. Lambotte and Depage have also done much original work in this field.

Mr. Lane[2] has recently published a paper in which he states that the economic consequence of the open treatment of fractures is of great importance, and his statistics show that the period of disability in fractures of the femur that have been treated by the conservative method, is much longer than when they have been submitted to operation. It is not infrequent that a patient is unable to resume his former occupation on account of the shortening or the deformity, which together with the lessening of the time of incapacity, must appeal to the laboring man of family upon whom the burden of support rests; these results naturally are obviated by the open method.

FRACTURES THAT MAY BE TREATED BY CONSERVATIVE MEASURES

There are, to be sure, forms of fractures, such as Pott's fracture, certain fractures of the tibia, radius, and ulna, that may be treated by conservative methods with good results; but even in this class it is at the expense of time, as well as marked discomfort to the patient. A common type is shown in Pott's fracture, where excellent results are obtained by the conservative method, but it will be admitted that the overcorrection of the foot by the usual treatment is very inconvenient and at times very painful. Furthermore it is practically three months before the patient is walking with any degree of comfort. and even afterwards he is constantly reminded of his leg on account of the discomfort that he experiences. Most of this inconvenience can be eliminated and the period of convalescence considerably shortened by an operation that will restore the anatomical relations and which is practically free from danger.

GENERAL CONSIDERATIONS

The operative treatment of fractures has shown that when the fragments are brought into apposition and there maintained, that bones unite by primary union, as the tissues do, without the formation of any callus whatever, the presence

[2] Practitioner, February, 1909, p. 197.

[1] Read before the San Francisco County Medical Society, October 18, 1910.

of callus being a sign that perfect approximation has not been obtained.

Before taking up the subject of operation, there is one point that should be emphasized, and it will not be out of place to mention it here before the technical side is considered.

Given, a patient with a fracture that is being cared for by a general practitioner without special surgical training and who is indifferent to surgical cleanliness; here the proper treatment is conceded without discussion, for the conservative method often gives a satisfactory functional result. On the other hand the qualified surgeon with reliable operating room service and a good personal technique will get results by operation with an ease and a comfort to his peace of mind that is foreign to the experience of one employing the conservative method only.

A consideration of importance is the question of immediate operation, and by that is meant that fractures should be operated upon as quickly as possible after the patient is brought under observation.

It has been generally accepted that the displacement in fractures is due to the contraction of muscles, but if a fracture is examined immediately after it has been produced there is little or no trouble in the *majority* of cases maintaining the fragments in position, showing that the contraction of muscle does not cause the displacement in the sense that it has been thought to do.

The difficulty experienced in holding the bones in position increases *pari passu* with the length of time that elapses between the accident and the bone setting, so that it is to be assumed that the displacement of the fragments is due to a change in the muscles that have become infiltracted with coagulated blood, which causes a contraction of the tissues, thereby favoring displacement. This condition is easily demonstrated at operation performed immediately after the accident, before the tissues have had time to become saturated with blood that subsequently coagulates, and it is surprising with what ease a fracture at the upper third of the femur can be approximated, little or no extension being necessary, while if the operation is performed a few days later much greater difficulty is experienced in bringing the fragments together.

Furthermore, when fractures are operated upon early, the bones are easily approximated on account of the absence of muscular infiltration, and handling of the tissues is so reduced that large incisions are not necessary as is the case when the operation is performed later.

Operative interference in compound fractures will not be considered in this paper.

HANDLING OF THE TISSUES

Before the technique is considered, the following principle must be firmly established:

Tissues are not to be manipulated; there should be absolutely no handling of the structures where it is possible to avoid it; rubber gloves should always be used and whenever a glove is punctured, it should be changed immediately to prevent the ejection of micro-organisms through the opening; and lastly the same precautions of rigid asepsis should be observed as are followed in the surgery of the joints. Mr. Lane has laid great stress upon these points; he insists that the hand should be kept out of the wound altogether, and it is surprising with a little practice how one can plate a bone from start to finish without ever touching the wound. By observing this precaution, the possibility of infection is much diminished. Mr. Lane attaches gauzes to the incised tissues by means of vulsella, so that the skin is entirely out of sight; this diminishes the danger of contamination.

The sponges are held by long forceps and the fingers are kept out of the wound. In the retraction, the hands should not come in contact with the tissues. The bleeding points are clamped with long hemostats which are removed by torsion, for it is seldom necessary to ligate a vessel. A little experience teaches one to uncover a bone with comparative facility, and even when the fragments are very much displaced, it is surprising how they can be approximated without manual contact.

HEMOSTASIS

Hemostasis is largely a matter of personal experience; many surgeons employ the Esmarch bandage in operations upon fractures; others do not because the removal of the tourniquet is followed by secondary oozing which interferes with healing, and it also favors infection. As the bleeding is comparatively limited in these operations, I have not found it necessary to employ the rubber bandage, but if it is used, it should be applied *before* the disinfection of the skin is commenced; if this is not done contamination may occur.

DISINFECTION OF THE SKIN

Scrubbing up the field of operation hours before, followed by the application of a compress, has the effect of macerating the tissues, so that the appearance of bacteria is promoted to the surface of the skin, upon which considerable

pressure is often exercised. As this structure is softened infection is facilitated.

As wound healing in emergency cases is excellent, and as fractures cannot be thoroughly scrubbed until the anæsthetic is administered, it would seem best to dispense altogether with the preliminary compress and to do all the necessary cleansing while the patient is on the table. Iodine being in general use, it is advisable to wash this substance off with alcohol, for the large blebs that follow fractures are more pronounced if the iodine is not so treated.

An aid worth mentioning as a preliminary to operation, is to mark the situation of the fracture by a needle scratch on the skin, for when the limb is covered with towels, it is often difficult to decide where the incision should be made. This procedure, in my opinion, is of value because it does away, subsequent to the disinfection, with a certain amount of manipulation frequently necessary to reveal the location of the fracture.

After thorough sterilization of the extremity, cloths should be attached to the skin by means of small vulsella, which keep the field of operation well protected.

INSTRUMENTS OF IMPORTANCE

There are two instruments that facilitate, without manipulation, the approximation of fragments, that should be mentioned here.

Lane's bone forceps is an instrument that is of the greatest value, and I have yet to find anything that will compare with it in its efficiency. There are two sizes of the forceps, and the jaws are curved in such a way that they permit of a firm grasp of the bone so that the fragments can be brought into position and held there during attachment of plate without crushing tissues.

Kocher's elevator is also of decided value; this instrument was first advocated by the inventor for use in the open operation to reduce the congenital hip-joint dislocation. Its shape makes it possible to be used as a lever as well as a fulcrum, which renders the reduction of the displaced fragments less difficult. These instruments have long handles so that manual contact with the wound is not necessary.

Last but not least is the automatic screw holder and screw driver. This instrument in my opinion lessens the difficulty of the operation very materially, for it obviates the necessity of employing a forceps to hold the screw and really does away with an extra hand (Fig. 1).

CRUX OF ALL BONE SUTURE

The most important consideration is that the fragments must be released so that they can be approximated without strain; the serrations in the fracture should interlock with those on the corresponding side. When the fragments are thus jammed together before suturing is begun, the limb can often be moved without displacing the bone. In oblique fractures approximation is more difficult to obtain, but even in these fractures, when once the fragments are entirely freed, it is surprising how easily they can be maintained in position.

It is important that there should be no denudation of the periosteum.

BONE SUTURE

Many methods have been advocated for the purpose of uniting the fractured ends of bones, but these will not be considered. Wire of course is in general use, and at times it is still employed where the bone plate is not feasible.

Staples. The staples that Mr. Lane formerly advocated but which he has since given up have again been popularized. There are certain drawbacks connected with the employment of staples and few advantages, so that one who has had any experience with a bone plate will, in my opinion, soon discard the staple and only use it in the exceptional case.

The disadvantages of the staple:

First, a good staple is difficult to obtain, and when it is not carefully made it may break when it is being driven home. As a consequence the employment of considerable force is necessary to extract the arm of the staple that becomes firmly wedged in the bone.

Second, the staple does not produce absolute fixation of the fragments even after several have been employed.

Third, this is best shown in a statement made by a prominent surgeon during a recent conversation, when he said, "In order to use the staple successfully a surgeon must be an expert in the use of the plaster Paris dressing," which means that even after a bone has been united by staples the surgeon is generally a creature of fortune and the plaster bandage, as to whether the fracture will be held in correct position.

Bone plates. An experience with the bone plate will convince anyone that its employment is based upon correct principles, and that the results obtained by its use are almost perfect, for the fragments are restored to their natural anatomical relations. When the bones are properly united the limb can often be moved without any false motion at the point of fracture. This condition can best be seen in fractures of the upper third of the humerus and of the femur

before the soft tissues have been united, showing that the bone suture is submitted to but little strain. Up to this time most of the bone plates that have been exposed for sale have been too heavy. My experience has taught me that fractures in adults in the upper third of the femur can be united with plates much thinner than those in general use.

The material that I have used in the manufacture of the plates is the Sheffield tool steel, the heaviest of which is not more than one millimeter in thickness, the thinnest being considerably lighter. This steel can be cut with a cold chisel and it can be easily drilled without drawing the temper, so that the plates are readily made in the laboratory by any one having a little skill in the use of tools. The drilled holes must be counter sunk to enable a screw to penetrate the bone up to the head.

Screws. For fracture of the femur and humerus a No. 6 flat head machine screw one-half inch in length is employed. A No. 6 three-eighths inch in length is also very serviceable; for lighter work and thinner plates a No. 4 flat head machine screw one-quarter of an inch in length is employed. These screws penetrate one side of the bone only and do not enter the medullary canal. Experience has shown that when the compact tissue on one side is entered a longer screw is unnecessary, as the shorter screw holds sufficiently well for all purposes.

The wood screw does not give as strong a grasp as the machine screw does, for the latter exercises the same pressure throughout the length of the hole. The bite of the wood screw is not as firm on account of its taper. This fact is well known to all mechanics. Another point of importance is that the machine screw is cut to the head while a wood screw cut in this manner is almost impossible to obtain in the instrument stores. If the screw is not cut to the head, more than one-half of its efficiency is lost because in bone suture that part of the screw near the head serves the most important purpose. The hole that is drilled into the bone is several sizes smaller than the one that is used in drilling metal; this is done because of the softness of the bone tissue.

Screw holes in plates. The number of holes in the plate is often excessive, and I believe that two holes in one end and one in the other is generally sufficient to fixate most fractures of the long bones.

Extension. It is surprising how seldom traction of a limb is necessary when a fracture is operated upon early, and it can be eliminated in most instances. When extension is necessary, however, counter traction and the pulley and the loop of worsted over the ankle, such as is advocated by Sherman,[1] is very satisfactory.

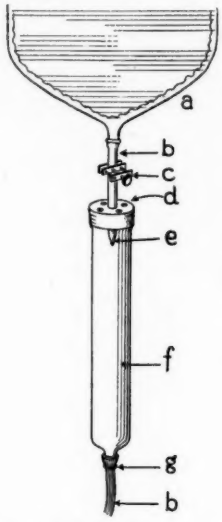
Drainage. Drainage is seldom necessary, for when the muscles are brought together and the dead spaces are obliterated, bleeding is moderate and it generally takes care of itself. There is always a discharge of a great amount of serum during the first twenty-four hours, but this then subsides and is of no moment.

[1] Annals of Surgery, September, 1908, p. 429.

AN EFFICIENT INEXPENSIVE ENTEROCLYSIS APPARATUS

By W. A. DEWITT, M. D., Philadelphia, Pennsylvania

TAKE the ordinary six inch metal top glass dressing syringe. Remove the plunger. Perforate the metal top in from two to four places around the opening from which the plunger has been removed. These perforations are necessary to permit the escape of gas expelled while the rectal tube is in place. Through the opening from which the plunger has been removed insert a tight fitting barrel of a glass medicine dropper. In order to give a sufficiently large opening at the lower end of the syringe this end must be filed away at from three-eighths to one-half inch from the point and flanged in the heat of a flame. The flange is to retain the rubber tubing leading to the patient. One end of a short piece of rubber tubing (2 in.) is slipped over the end of the medicine dropper, the other end is slipped over the lower end of the douche bag, thus connecting the apparatus with the bag. On this tube is placed a thumb screw by which the rate of flow is regulated. A long rubber tube is placed over the flanged end of the syringe barrel, and to the lower end of this the rectal nozzle is attached. The heat is maintained by placing hot water bottles along the tube. The apparatus is suspended at a height sufficient to bring the flanged end of the syringe barrel about 12 inches above the patient's buttocks.



a, Double bag. *b*, Rubber tubing. *c*, Thumb screw. *d*, Perforations. *e*, Glass medicine dropper. *f*, Barrel of glass dressing syringe. *g*, Flanged end.

A SPEEDOMETER FOR PROCTOCLYSIS APPARATUS

By WALTER S. SUTTON, M. D., Kansas City, Kansas

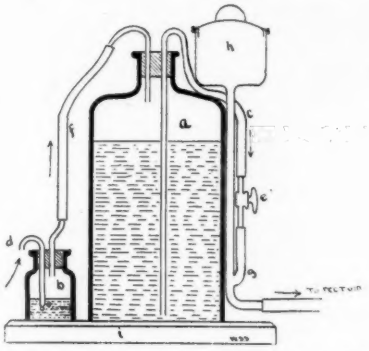
THE following described and figured apparatus was devised by the author for indicating the speed at which saline solution is being introduced into the rectum. It may be attached to many different forms of proctoclysis outfits, practically the only restriction being that the saline reservoir be capable of being closed air tight. It consists of a simple wash bottle through which passes the air which replaces the saline flowing out of the reservoir. Thus in the arrangement shown in the sketch it is evident that when the saline is siphoned out of the container "a" through the tube "c," the air to replace it must come in through the tube "f," but the tube "f" draws its air only from the wash bottle "b" into which other air can enter only by passing through the tube "d" and bubbling up through the water. The caliber of the tube "d" at its lower end is such that the bubbles which emerge from it are of practically the same volume as a drop of the saline solution.

Thus the drops of solution passing unseen into the rectum are registered by the bubbles of air passing through the wash bottle. Unquestionably the best means of regulating the flow of solution is a glass stopcock of small caliber, since this when partly closed leaves a fairly wide ellipsoidal aperture which is less easily occluded by solid particles in the solution than the slitlike aperture

formed by compressing the rubber tube with a hemostat or screwclip. We have been able to regulate it easily down to 24 bubbles a minute which is equivalent to three or four ounces of fluid per hour.

By this slow accurate instillation many cases will retain the fluid perfectly when grosser methods have failed. To allow free expulsion of gas a Y tube "g" is placed in the conveying tube between the reservoir and the stopcock, and is connected with an expanded reservoir "h" well above the surface of the saline solution, as in several generally employed types of proctoclysis outfits.

If it is desired to keep the solution hot this may be done in any of the usual ways. I have employed a vacuum jacketed bottle as a saline reservoir on the suggestion of Dr. Hugh Auchincloss of New York City, and have found it serviceable in maintaining the temperature of the solution. However, in the use of this apparatus which never allows the rectum to become flooded the question of heat is relatively unimportant, since the amount of heat abstracted from the rectum by the nicely regulated introduction of a



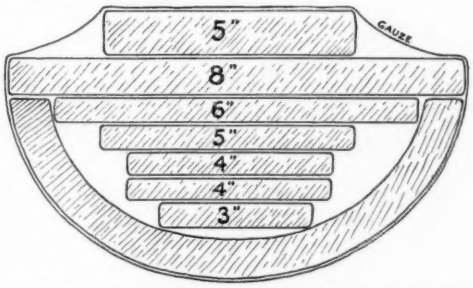
pint or less of fluid in the course of an hour is practically negligible.

For the benefit of those who are not accustomed to the siphon form of reservoir, it may be explained that the simplest method of starting the solution through the siphon "c" is to disconnect the tube "f" from the bottle "o" and by blowing into the former so increase the pressure in the reservoir "a" as to force the solution over the high point of the siphon.

AN AID TO RADIOGRAPHY OF THE URINARY ORGANS

By DANIEL N. EISENDRATH, A. B., M. D. Chicago, Illinois
Attending Surgeon to Michael Reese and Cook County Hospitals

WE have found the suggestion of Strater, i. e., to use a pad made of loofah material, a valuable addition to our technique of radiography of the urinary tract at the Michael Reese Hospital. The usual thorough purgation of the patient and the necessary restriction of the diet for the two meals preceding the taking of the picture is of course not dispensed with. The loofah pad is made as shown in the accompanying figure. A number of loofah sponges can be purchased at any drug store. Our radiographer, Dr. Turley, has modified the original suggestion of Strater by cutting sections of the loofah and covering them by one layer of it (see cut). The figures shown in the illustration correspond to the length in inches of each component part of the pad. The entire surface of the pad is covered by a single thickness of gauze, stitched together at one side of the pad. The uppermost layer is made just large enough to fit inside of the cylinder of the Albers-Shönberg compression apparatus which we invariably



employ in conjunction with the loofah pad. The object of the latter is to permit better fixation of the abdominal viscera for taking kidney, ureter, or bladder pictures without subjecting the abdominal surface to the direct contact of the compression apparatus. The loofah pad acts as a buffer, but does not offer any resistance to the rays. We have had such a satisfactory experience with this pad, that the writer thought it might be of value to others working in this field of surgery.

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING, HELD DECEMBER 16, 1910, WITH THE PRESIDENT, DR. GUSTAV KOLISCHER, IN THE CHAIR

DR. HERBERT M. STOWE, EDITOR

LEGAL ASPECTS OF POSTMORTEM CÆSAREAN SECTION

BY CHARLES S. BACON, M. D., CHICAGO, ILLINOIS

The following case from my service in the Chicago Lying-In Dispensary may furnish the basis for a discussion on this subject:

The patient, Mrs. G., aged 24, III gravida, first pregnancy, labor and puerperium normal, second pregnancy terminated ten months ago by abortion at three months, and cared for by the dispensary, began labor about 5 A. M. November 7, 1910, and sent for aid about noon of the same day. She had not registered during her pregnancy, although it afterward appeared that she had suffered much from nausea and lately from headache. The nurse and students who arrived at the house at 12.25 P. M. found the patient up and around. She seemed to be somewhat refractory and not quite clear in her mind. There was no history of convulsions. The interne arrived at 1.15 and at first was inclined to make a diagnosis of hysteria from the symptoms and also from the history elicited from the husband and neighbors.

The examination disclosed a cephalic presentation, head above the inlet, cervix not effaced, and closed, scarcely admitting one finger. When I was notified of these findings I directed the patient to be catheterized and the specimen to be examined. The urine was found "loaded with albumen." This being reported I directed that the patient be sent to the University Hospital if her condition justified her removal. The interne called on one of the assistant obstetricians, who agreed to the removal, as there seemed to be no immediate danger. The patient's pulse was somewhat irregular, from 70 to 90, and temperature about 99° F. Just before entering the ambulance the pulse was 110. During the ride of about one mile the pulse became very rapid and weak and upon her arrival at the hospital she was evidently dying. Her condition was reported to me and I told the interne to make a postmortem Cæsarean section as soon as the patient died, in case her death occurred before my arrival. When I reached the hospital I found her dead but the abdomen not opened. The interne said that the husband of the patient who had accompanied her to the hospital had absolutely forbidden him to make the operation.

I immediately examined the body of the woman and found her dead. She had been dead about 20 to 25 minutes according to the reports of the interne and nurse. Then I listened over the abdomen and heard distinctly the fœtal heart tones. One of the internes also confirmed my findings. I at once opened the belly and womb and extracted the child. It was alive as shown by the beating of the heart, which was determined by myself and my assistant, but it was impossible to secure respiration, although efforts to resuscitate the child were continued for some time. Just before the death of the mother, which occurred about ten minutes after reaching the hospital, the interne found the fœtal heart tones. His findings taken in relation with my own 30 minutes later convinced me that the child was viable at the time of the mother's death, and had it been removed immediately it might have been saved. The action of the husband in forbidding the section was therefore probably the cause of the death of the child. Had I been present I should have ignored the veto of the husband had he persisted in it and made the rescuing operation in spite of it. He was not present in the room when I arrived and hence no necessity existed for my speaking to him. The interne was not certain of his power or duty and hence when the man positively prohibited a section he feared to carry out the orders I had given by telephone. It may be added that later the husband expressed

his deep regret that he had blocked an earlier effort to save the child by a section on his dead wife.

On account of the lack of permission for a postmortem examination on the mother or child the latter was returned to the uterus after the efforts at resuscitation had failed and the incision in both uterus and abdominal wall closed. The next day the coroner's physician held a postmortem examination on the case and found the gross changes of a nephritis. The examination of the kidney, liver, and heart by the pathologist of the hospital, Dr. Hayhurst, showed chronic diffuse nephritis with evidence of acute congestion; no changes were found in the liver or in the heart muscle. The case was therefore one of uremia and not of eclamptogenic toxæmia.

I shall not attempt to give a complete history of postmortem Cæsarean section nor discuss it in all its bearings, for the subject is familiar to all from the numerous articles and discussions by writers of all countries for hundreds of years, and especially from the papers of v. Winckel, Fehling, Pinard, Dohrn, and Kleinhaus. It will be necessary only to review briefly the changes in the professional and lay sentiment on this subject and mention the indications for the operation that have been accepted by the most experienced teachers.

The law of Numa Pompilius, the lex regia, which provided that no pregnant woman who died should be buried until her child was removed, shows that postmortem Cæsarean section is one of the oldest obstetrical operations. Osiander suggested that this operation and the law requiring it was probably due to the frequent observation that the young in the mothers' bodies in animals killed in hunting or in religious sacrifices might outlive the mothers. This law was, no doubt, carried into the various countries of Europe with the Roman conquest. It was sympathetically received by the Catholic church, which directed the baptism of all children removed by the section method without regard to the age of the fœtus.

In some countries, for example Austria, the lex regia still exists with little change. In Bavaria, Württemberg, and Saxony, section is required after the sixth month, or after the child is viable. In some countries the necessity for and the right to do the operation appears to be left to the attending physician. In this country I have not been able to find any statutes nor common law decisions on the subject. In the absence of such decisions, I suppose that the old Roman and European laws and customs would have considerable weight in a judicial decision concerning the justification of an operation. The question of the rights of a husband or other relative would be determined by other laws and decisions and by questions of equity and common sense. Preliminary to further consideration of this, the chief object of our discussion, we will for a moment turn our attention to certain professional phases of the subject.

Perhaps the most important thing to be considered is whether the death of the mother can quickly and certainly be determined. From a legal standpoint it is necessary that the consent of the husband be obtained before operation on the wife if she be unconscious. Hence a Cæsarean section made before life ceases to exist would not be at the discretion of the physician and could not be justified if done without the husband's consent, much less if against his prohibition.

Cæsarean section on the dying has been much discussed in recent years and advocated because it promises much greater chance to save the child's life. It involves quite other legal questions than postmortem Cæsarean section.

Though not exactly pertinent it might be said in passing, that where an absolutely hopeless prognosis for the mother can be made and this confirmed by a colleague, as for example in a carcinoma, and where the fœtal heart tones or movements can be determined, the section of the moribunda can and properly should be made, provided the consent of the husband or other near relative is secured.

It being acknowledged that it is necessary to determine that death has certainly occurred we are brought face to face with the fact that it is sometimes very difficult to decide when the last breath has been drawn. Anyone who has witnessed a number of deaths knows that respiratory efforts may occur a minute or more after he had decided that the last gasp had been made. Should such movements occur while we are making the incision in the presence, perhaps, of relatives who had opposed the operation we might be put into a very uncomfortable legal dilemma. If we wait long after the apparent death, we are losing most precious time for the child, for every minute's delay probably means a decrease in its chances of ten per cent or more. Hence our decision involves a great responsibility that should be fully understood.

The question of the next importance is whether the fœtus is living or not. As we all know it is sometimes difficult to hear the heart tones when the child lies with back posterior or when there

is a large amount of amniotic fluid, or when the abdominal walls are very thick in obese or edematous conditions. At the moment of death, if relatives are present, there is generally much commotion with crying and lamentation that makes a careful ausculation impossible. If we can secure quiet in the room we are favored by the absence of the uterine bruit which during life often interferes with our listening. I think we should always prepare for the operation beforehand, if possible, and also try to get the heart tones before the section; using, however, no more than a fraction of a minute for this purpose. In case the heart has been heard a few minutes before death, postmortem ausculation may be omitted. If the fœtal heart is beating or if fœtal movements are detected just before death or after death we have I believe a positive and imperative indication for the operation.

Should the evidence of fœtal life be lacking, we are still justified in hoping that it still exists for a brief period postmortem. The length of time the child may live after the mother's death has been a subject of much discussion and experimentation. The latter has shown that death generally occurs within five to ten minutes. In the human subject, however, numerous observations have shown that the fœtus may live from fifteen to twenty minutes. In my own case, the mother had been dead twenty-five minutes before the section was made. The cause and manner of death of the mother no doubt has considerable bearing on this subject, but it is not necessary to consider these factors nor to go into an explanation of how the child continues to live or the manner of its death, in order to establish a general law or rule of routine practice. In order that no chance of saving a fœtal life may be lost and at the same time to avoid unnecessarily hurting the feelings of relatives and friends, we may adopt the limit of 25 minutes after death as the longest time the fœtus can live and the latest moment that a section is justifiable.

During this period of 25 minutes should the section be required if the evidence of fœtal life is not positive?

Some have become discouraged with the operation because of the small number of children that have been saved by it, and have seemed to doubt if it paid to combat the sentiment against it for the small results. No doubt the percentage of children saved would be greatly increased if the operation was confined to those cases where the child was certainly living before it was made. However, I should answer yes to the question for the same reason that we try to resuscitate an asphyxiated newborn child or a person apparently drowned.

Neither parent nor anyone else should have the right to prevent the physicians from trying the Schultze swings or any other method of treating asphyxia neonatorum, on the ground that these manipulations on a child are disturbing to his feelings. To his eye the child is dead and the swings are brutal, but the physician knows that they sometimes bring results in apparently hopeless cases. So here ignorant sentiment should not decide, but the chances taken should be in favor of the life and not against it.

It is hardly necessary to add that the fœtal life that we have in mind is one sufficiently developed to give a chance for continued existence. A fœtus of 25 or 26 weeks that could have no hope of living outside of the body of the mother more than a few hours can have no reasonable claim. We admit the usual limit of viability of 28 weeks as fixed by agreement of all obstetrical authorities. Hence the section should be made only when the pregnancy has advanced 28 weeks.

It seems to me that these two questions, whether the woman is really dead and whether the fœtus of 28 weeks or more is probably or possibly alive, are all that need to be considered in establishing a rule of practice or a legal mandate. Some writers have had much to say about the natural objections of the husband and relatives to the operation, which they admit is brutal under the circumstances. That this objection is often raised is true and the case reported is no exception. Mauriceau barely escaped with his life from the rage of a husband incensed at his proposal to make the operation on his wife. This objection to the operation does not seem to me however well taken. It could equally be urged against most of the sanitary laws. Vaccination may seem a brutal and tyrannical act to the ignorant but it is nevertheless most humane. All unnecessary operations, as those when the child is surely dead or when it is not viable, should not be made. In some cases explanations of the reasons for the operation should be made beforehand so as to prepare the relatives and interest them in the hope of saving the child. If properly understood none would object to it and the physician should have exercised his functions as a teacher sufficiently to know how to explain the reasonableness of this operation, the oldest in obstetrics. In rare cases, when the cervix is completely dilated and the head in the outlet, a postmortem forceps extrac-

tion could be made and would meet perhaps less opposition than a section.

Returning to the legal aspects of the case reported and of the operation in question, I would claim that the operation was right for the following reasons: 1st. The husband's right to determine whether an operation shall be performed on his wife ceased with her death. So long as she lives, his right is admitted in case she is incapable to decide herself. But in a strict sense an operation cannot be performed for a dead person. All reason for the rule giving the husband the power of consent or refusal to operate on his wife terminates with her death. 2d. The right of the husband to the custody and control of the body of his dead wife does not go to the extent of preventing such disposal of it as may be necessary to keep it from injuring another human being. That the husband has the right to prevent an autopsy unless such is demanded by the state is clearly shown in definite decisions, for example in New York, the case of Foley vs. Phelps, where the court decided that the defendant was liable to the widow for damages for making a postmortem examination on the body of her husband without her consent. In my case, however, the incision into the body was not done for the purpose of making an examination but to save the fœtal life. I would regard it like moving a dead body off a living human being which in some way, perhaps a railroad wreck, had become imprisoned under the corpse. If it should be necessary to sever a limb from the corpse in order to release the living being, it could not be called an injurious mutilation. There is no property right in the dead body. The injury is the damage done to the feelings of the survivor. It would seem that an action taken to save life could not be classed as unlawful. Hence we hold that the right of the husband to the control of the dead body of his wife among other restrictions does not apply to such a disposition of it as may be necessary to save life. 3d. The obligation to save the human fœtal life when it can be done without destroying or seriously jeopardizing another life is absolute. Reason and every humane sentiment would support this proposition. Even if the status of fœtal life is not legally as fixed and high as that of extrauterine life, I believe that all will agree that both are protected for the same reason and by the same sentiments.

It is interesting to inquire into the legal status of the fœtus. Certain rights have been accorded to it and there is a tendency to extend these rights. The law, both statute and that made by the courts, is dependent upon the general sentiment of the community and registers in a general way the advance of this sentiment in knowledge and morals. This is well illustrated by the history of the laws concerning abortion. The old common law did not recognize the fœtus before quickening as a being and its destruction or the procuring of an abortion before the quickening was no offense. After quickening, procuring an abortion was a misdemeanor but not a crime punishable with imprisonment. Now, as we know, all states have statutes making the induction of abortion a crime at any stage of gestation except when necessary to save the life of the mother. The abortion laws, however, do not give the fœtus a distinct status with recognized rights. We might infer that the induction of abortion is forbidden more because it is an injury or a risk to the mother than because it destroys life. Yet the law does not attempt to protect the mother or any other individual from other operations in the same way. This implies that the destruction of the fœtus is in some way an injury to society. Moreover, when the mother dies as a result of a criminal abortion, the operator is guilty of murder. This of course is not true in the case of any other operation. Hence it appears that in the abortion laws that have been passed to meet moral and social demands of the community, a certain value in fœtal life is implied.

The lex regia and its modifications in Europe and other countries imply a recognition of the worth of fœtal life and in some respects go indeed farther than modern science would require or allow.

The law that makes the abortionist a murderer when the death of the mother follows can be best explained on the principle of "constructive intent." In all other cases intent to destroy life is necessary to make the crime murder. If, however, when the attempt is made on the life of one person, another and not the one intended is killed even accidentally the act is murder. This is an example of constructive intent. Now in an abortion there is no intent to take the life of the mother but the destruction of the child in ventre sa mere is intended. The destruction of the mother unintentionally follows and therefore on the theory of constructive intent, if the fœtus is recognized as an individual with the right to life, becomes murder.

Certain civil rights of the infant "in ventre sa mere" have been long recognized even at every period of gestation. More recently some interesting cases have come up which have a bearing

on the subject of fœtal rights. One of the most important is the case of Allaire vs. St. Luke's Hospital, Chicago. In this case, the plaintiff was an infant which sued the hospital for injuries received while in the fœtal state because of the negligence of the defendant. The mother, while pregnant, went to the hospital for care during her confinement. She was injured in the elevator and the injury to the mother also caused injury to the fœtus so that at birth and afterwards part of the body was paralyzed. The advocate of the plaintiff advances the facts in support of his client's claim that the fœtus may have certain rights, for example, the right of inheritance, and the right to a guardian. He claims that it is not reasonable to suppose that "rights of persons" may exist and not involve "rights of things." According to the common law and Blackstone, life begins when the child quickens in utero. The decision of the superior court, Judge Ball, was for the defendant. The appellate court concurred in the decision, Mr. Justice Windes objecting. The case then went to the supreme court which also agree with the appellate court, Mr. Justice Boggs objecting. The minority decisions of Justice Boggs and Windes present the side of equity and logic most convincingly while the majority decisions are based upon precedent. They deny the separate existence of the fœtus with all rights that pertain to an individual because former decisions do not seem to warrant such a grant. They suppose, as has been done before, that the admission of certain civil rights to the child in ventre sa mere is a legal fiction allowed for special cases. The supreme court does not deny the justice of the claim of the fœtus but holds that its rights should be accorded to it by legislatures instead of by the courts.

An example of the confusion of the law in regard to the rights of the fœtus is seen in the following. In law the killing of the fœtus, as before said, is not murder. If the fœtus is injured with the object of killing it and it is born alive and afterwards dies of the injuries inflicted while in utero, the one who intentionally inflicted the injuries is guilty of murder. He intentionally caused the death of a person who had a legal existence although the injuries were inflicted before the legal existence began. If the injured fœtus is born and lives, although badly crippled, it can recover no damages in a civil suit according to the decision in the Allaire case, because it had not a sufficient legal existence when injured to give it this civil right.

These cases, however, seem to show a tendency to a greater recognition of the legal rights of the fœtus. Eventually, we must suppose that jurists and legislators and sociologists will co-operate with the obstetrician in an attempt to define on scientific and logical grounds the rights and claims of the fœtus. This may result in increasing the obligations of the obstetrician but it will also make them more satisfactory, for it will define several things that are at present obscure. Now when one contracts to care for a woman in pregnancy, labor, and the puerperium, including the care of the newborn, it is not clear just how far his responsibility goes in the care of the fœtus or to whom he is responsible for such case.

That a viable fœtus has the same right to live as any other human being is I believe a proposition in accord with moral, social, and scientific laws, and should become a legal proposition. This does not imply that it has greater rights than the mother. If she is endangered by it she may protect herself even to the extent of destroying it, just as anyone has the right to self-preservation, when attacked by an irrational person. This rule would require a postmortem Cæsarean section, or in rare cases a postmortem delivery operation through the natural passages in every case when the fœtus of at least the 28th week of gestation is known to be living at the moment of the death of the mother. It would also probably require the physician to use his judgment when he could not certainly determine that the fœtus was living, with the understanding that after 25 minutes from the death no operation should be made.

DISCUSSION OPENED BY A. F. REICHMANN, ESQ., OF THE CHICAGO BAR

The question under discussion is, so far as my reading and research have gone, an entirely new and novel one, and has never yet been even considered, much less determined by any court. In fact, it may be said that the law, with reference to the bodies of deceased persons and the questions that have arisen and that may hereafter arise in respect to them is, to a considerable extent, in an evolutionary state. We have only within comparatively recent years, passed from the point where a dead body was not considered as property in any sense of the word, or indeed, accorded any real or substantial recognition in the law.

In order to arrive at a conclusion, therefore, it will be necessary to consider somewhat the general state of the law, as it was, and as it now is, on the subject.

From the earliest times in England, it was the established law that there was no such thing as property in the body of a dead person, and as a necessary corollary, no liability could arise, either civilly or criminally, from the taking, handling, mistreatment, or mutilation of a body. It was thus early held that it was no crime to steal a body. No action would lie at law to recover its possession, as by means of replevin, or failing in this, to recover its value, as by means of trover, because in contemplation of law, not being property, it had no value. All these things were true in England because, upon the death of a person, the disposition of his body became a matter for the public, and was in charge of public officials, as for example, the coroner or the executor of the deceased's estate, who was regarded as a public official appointed by the court. As against the public authorities, the next of kin, or surviving husband or wife, had no claim which the law recognized, and which they could assert. From a very early period in England, the ecclesiastical courts assumed exclusive jurisdiction over all such matters.

Upon the separation of the American colonies from the mother country, the ecclesiastical courts and their jurisdiction were finally and ultimately repudiated; and, this whole question, if any jurisdiction was to be exercised in reference to it, was necessarily relegated to the temporal courts of this country. At the beginning, the courts of the various states of the Union were inclined to follow, with unquestioning acquiescence, the general doctrines and precedents laid down by the English courts and constituting a part of the common law of the land.

The earlier cases are harmonious in saying that there is no such thing as property or a property right in a dead body, which the law will recognize or protect. The common law of England and this country, however, is a matter of evolution. It is not a fixed and inflexible system, but on the contrary is a system of certain fundamental maxims, elementary principles, and judicial truths, which is continually expanding with the progress of civilization, and adapting itself, by a process of gradual development, to the changed conditions of society, of business, and of public sentiment.

Thus, even in England in early times, the courts of chancery exercised their jurisdiction, to a limited extent by injunction, to protect and preserve the repose of the dead after burial; and the removal of a body from its grave, without the consent of the ecclesiastical authorities, or for mercenary or wanton purposes, was held to be a crime. In this country the same jurisdiction was early exercised by courts of chancery; and the legislatures of the various states soon passed statutes making it a crime to remove bodies from their graves for unlawful purposes. While in England, bodies passed into the jurisdiction of the public authorities, in this country, almost from the beginning, the duty to give bodies burial, and to pay all the incidental expenses, was imposed by law upon the surviving husband or wife, or the next of kin. The law, having imposed this duty, naturally recognized the correlative legal right to discharge the duty without interference, and thus it was a step for the courts to hold, that any unlawful interference with this legal right and privilege constituted a legal wrong. When the first cases arose in which actions were brought by the surviving husband or wife, as the case might be, or by the next of kin, to recover damages for the mistreatment or mutilation of a body, the courts were confronted by their oft repeated previous holdings, that the law recognized no such thing as property or a property right in dead bodies. To avoid this doctrine and the consequences resulting therefrom, and to give a legal remedy where a legal right had been invaded, the courts adopted an intermediate position, and said, that although a dead body is not property in the usually recognized commercial sense of the word, yet, it must be considered as a sort of quasi property, to which certain persons may have rights, "as they have duties to perform toward it, arising out of our common humanity," as was said in one of the earliest cases on this subject. While not exactly holding that there can be such a thing as property in a dead body, they rather treat the right of the surviving husband or wife, or of the next of kin, to the possession for interment, as a kind of property right, to which the law affords its protection.

It may be said, therefore, that it is now the settled law of this country that the possession of a dead body belongs to those most intimately connected with the deceased by domestic ties, for the purpose of decent burial, and that this right belongs primarily to the surviving husband or wife, and then to the next of kin. It is now equally well settled, as is said in one of the leading cases on this question, "that the custodian of it has a legal right to its possession, for the purposes of preservation and burial, and that any interference with that right, by mutilating or otherwise disturbing the body, is an actionable wrong," for which suit may be brought, and damages recovered.

The courts, having progressed thus far, were confronted by another difficulty, and that is, the general doctrine that only actual damages may be recovered, and that in no event can damages be recovered for mental suffering and wounded feelings, excepting in cases where actual damages have been sustained. In order to make effective the doctrine laid down by them, and to give an effective legal remedy for a legal wrong, they advanced a step farther, and now are in substantial accord in holding that even if no actual damages have been sustained, which, in the very nature of the case, must be true in most instances, the person or persons injured may, nevertheless, recover substantial pecuniary damages as compensation for their mental suffering and their wounded and outraged feelings; and there are not a few cases in the books, decided within recent years, in which substantial damages have been recovered, and the recovery sustained by the courts of last resort.

It will thus be seen, that any unlawful mistreatment or mutilation of a corpse will give rise to an action for damages against the guilty person or persons, and in favor of those whose legal right to the possession of the body, in the state in which it was in at the time of its death, has been invaded.

The question still remains, however, whether such an action will lie in case of the justifiable performance of a Cæsarean section or operation, without the consent, or even against the protest of those who are entitled to the possession of the body. This is still an open question; and, in my judgment, despite all that the courts have said, it does not by any means follow that such an action will lie.

While the law now recognizes a legal right to the possession of a dead body, and gives a legal remedy for the violation of that legal right, yet the legal right in question is, after all, merely a relative, and by no means an absolute one. There are various elements and considerations which, under proper circumstances, very materially affect and diminish this right and its resulting violation; and in fact, in some instances, well recognized in the law, totally supersedes it.

As we have seen, the right in question grows primarily out of the duty imposed by our law upon those in whose favor the right is created, to take charge of the body and give it decent burial; and also, as inseparably associated, if not indeed the foundation of this right, the instincts and sentiments of humanity, recognized by all.

There are certain principles of public policy, well recognized by the courts and announced by the legislatures, which, under certain circumstances, completely supersede the right we have been discussing. Thus, in the interests of public health, states and municipalities in the exercise of their police power, have the right to regulate the places of burial, and even to disinter human bodies and re-inter them in other places without the consent and even against the protest of those in whom the primary legal right to their possession is vested. Legislatures and municipalities may and do prescribe regulations under which no body shall be buried without a certificate of the attending physician, or of a coroner's jury, showing the cause of death; and it has been held that the attending physician may hold a post-mortem examination of the body if, without it, it be impossible for him to issue the certificate required by law. So, it is well settled also, that a coroner has the right, where it is disclosed to be reasonably necessary to enable the jury to render an intelligent verdict as to the cause of death, to have an autopsy performed on the body, and even to exhume it for that purpose, despite the protest of the surviving husband or wife, or next of kin. So, where there is just ground for believing that a person has died of a dangerously contagious disease, but this cannot be determined with certainty without an autopsy, an autopsy may be held in the interests of public health, and as a condition to its burial in the ordinary cemeteries of the community. This power is, of course, given in the interests of public health and public justice, to which the private right in question is held subservient and subordinate. It has also been held that if, upon proper showing in a criminal case, it be made to appear that an autopsy is necessary, either before burial or after interment, in order to prevent a miscarriage of justice, the court in such case has the power to order the autopsy required and act on its own motion or at the request of the accused as well as of the state; and, in a case in which this was held, it was well said, "It is evident from the authorities, both in this state and elsewhere, that neither the right of sepulcher, nor the right to have the body remain untouched and unmolested is an absolute and fixed right, *but these rights must and should yield when they conflict with the public good, or where the demands of justice require such subordination.*"

So, even in a civil case brought to recover upon an insurance policy, decided some years ago, where an application had been made by the insurance company for the disinterment of the body, the court said that it was "not prepared to say that in a proper case the court, in the interests of justice, should not compel the exhuming

and examining of a dead body, which is under the control of the plaintiff, if there is strong reason to believe that, without such examination a fraud is likely to be accomplished, and the defendant has exercised every other method known to the law of exposing it." And, in a recent case, decided in 1907 by one of the United States district judges, in another suit brought to recover on an insurance policy, the court ordered the marshal of the district to exhume the body for the purpose of having it examined by surgeons appointed by the court, in order to determine whether a recovery should be had in the case or not, and thereby prevent a possible, if not probable, fraud upon the court and a miscarriage of justice.

It will thus be seen that the right we have been considering is, after all, as a practical matter, very much limited and circumscribed, when the interests of the public health, well being, justice, and general principles of public policy require it.

In the light of these preliminary considerations, therefore, let us endeavor to ascertain the probable attitude of the law toward the preservation of human life through the instrumentality of a Cæsarean section or operation. We are told that it was decreed by the Romans that no pregnant woman should be buried until the fœtus has been removed by Cæsarean section. I understand the Italian laws at one time, if indeed they do not now, required the same. It will thus be seen that the humanity and public policy involved was thus early recognized and embodied into laws. Strange to say, however neither the Parliament of England nor the legislatures of this country have ever expressed themselves.

First and foremost, we have the universally recognized fact, that the law and public policy of the land looks with favor, and in some instances, actively and affirmatively encourages the marital relation, and by its means, the creation of human life and the upbuilding of the family. Is it likely, therefore, that the law will frown upon any effort to promote its policy, or lend sympathetic sanction to an unreasonable and sentimental obstruction to the accomplishment of its aims and purposes?

Again, the preservation of human life is of the greatest concern and solicitude to the law and the public policy of the country, and all other things and considerations are subordinated to this. Its recognition is found in the fact that self-defense is a complete legal justification for the killing of another human being, and the law justifies the killing of another, not only to save his own life, but one intimately related to him.

This being the attitude of the law, is it to be believed that it will look with favor upon one, who from considerations at best merely sentimental, despite the advice of men learned in the science of medicine and surgery, would prefer to see a human life lost, that might be saved, rather than permit the disturbance of an inanimate body that, after all, with the lapse of but little time, will have passed into decay and dust?

Take an extreme case, for it is by such cases that legal principles are often best tested:

Suppose a woman far advanced in pregnancy, in good health, meets with a sudden accident resulting in her death, which in no wise affects the life of the child; it is known to the surgeon that the child is living and about to be born; would the law condone so abhorrent a thing that because of a refusal of the husband the surgeon was unable to affect the birth of the child — a life which the Creator has given? If, under these circumstances, the surgeon is protected under the law so that no damage suit will lie against him, if he performs the operation without the consent of or under the protest of those nearest the dead woman, it is only right and the only solution of the problem, providing that the surgeon is acting within the limitations of demonstrated known scientific knowledge, and that he is doing so with reasonable intelligence. To interfere under such circumstances would be murder — not absolute murder, because it is held in law that refusal of the husband or next of kin under the extreme circumstances outlined would not legally be murder, but morally, sentimentally, and every other way.

What would this be, but murder? And will it be said that the law will stand for this, and visit punishment upon one, who, responding to every humanitarian impulse, lends his effort to advance the highest policy of the law, and award damages to the other, who, without reason or moral justification, insists upon the extinction of a life that might be saved?

What moral or legal right have they to refuse consent? I dismiss from consideration all except the surviving husband. If his consent be unnecessary, and his refusal of no consequence in the eye of the law, then a priori, this must be so of the others. What right, I say, then has a husband to refuse consent? The mere fact that he is in part the author of the life in jeopardy gives him no superior right, when the question of life and death is involved. In a legal sense, he does not own that life to do with as he pleases. The early Persians, Egyptians, Greeks, Gauls, and Romans looked upon the child as the absolute

property of the father, and hence tolerated infanticide. The father, under the ancient Roman laws, had the power of life and death over his child, and this, on the principle that he who gave, had also the power to take away; but the rigor of such a doctrine was soon abated, and, under Constantine, death was visited upon the father for the killing of his adult child; and, under Valentinian, infanticide became a capital crime.

This barbarous principle of barbarous nations was, however, never tolerated by the English law, from which our law is taken. The father has no property in his child. He has, at most, merely the right to custody, and this, to enable him to discharge toward his child certain active and affirmative duties imposed upon him by law, for the violation of which penalties are imposed; and, in the end and ultimately, all these duties are designed to accomplish the preservation of the life and health and general well being of his offspring. He can be punished for its mistreatment, and hanged the same as anyone else for causing its death under like circumstances. His custody of the child may be terminated, and the child taken from him by the law, when its well being requires it. In its last analysis, the child belongs to the state and to no one else. Will it then be said, in the light of these considerations, that the father has the right, by withholding his consent, to cause the loss of a life, which after all, belongs not to him, but to the state and society; and in which his proprietary interest, as we have seen, is so slight? I can only answer this most emphatically in the negative.

We are told in Storer and Hurd that Dr. Lever consulted Dr. Taylor, the author of the celebrated work on medical jurisprudence, to know whether he would be justified in performing a Cæsarean section after the death of the mother, without the consent of the father, under circumstances that appeared unjustifiable homicide to allow the infant to die, and that Dr. Taylor gave it as his opinion that in the law the infant belonged to the father,—the infant with the life thereof; and that if Dr. Lever touched it, even to rescue it from death, an action would lie against him. I am entirely in accord with the statement of the authors in saying, "We must, however, declare such doctrine to be false and pernicious. If signs of the child's life remained, no physician should hesitate in endeavoring to preserve it, unless restrained by actual force."

Without detaining you any longer, however, permit me to say that I cannot escape the conclusion that given a case in which, in the light of existing scientific knowledge, the belief is reasonably justifiable that the infant may be rescued and its life saved, a Cæsarean operation will be justified by the law on grounds of public policy, and the person performing the same will be fully protected, both civilly and criminally, though performed without the consent, or even against the protest of those in whom the law has recognized a legal right to the possession of the body of the deceased, provided, of course, the operation be performed in good faith and with due skill, and without unnecessary injury or mutilation.

Dr. Frank Cary: My experience with the legal side of the matter has been such that I should wish to get consent before I undertook the operation. While I might stand all right with the judge, I might not stand all right with the jury. A case of this kind came under my observation some years ago. I was called in a case where a woman was in a uremic convulsion. The question arose whether immediate delivery should be instituted. Between the attending physician and myself and the family it was decided to call in another physician. He could not be reached at once, so that an hour or two of delay occurred. The woman came out of that attack, but had another convulsion, and it was decided that immediate delivery was indicated. Preparations were about to be made when she again had a convulsion and died. I at once suggested a Cæsarean section. There was considerable argument. I spoke to the husband. He demurred. I was rather insistent and he finally said that he would leave it to me. I made the section and delivered a living child, demonstrating that that was the proper thing to do.

Dr. Robert T. Gillmore: Dr. T. J. Watkins did a postmortem Cæsarean section on May 15, 1904, on a woman who died of eclampsia. The operation was done within five minutes after her death and a living girl baby was delivered. When last heard from, December 13, 1910, this little girl was well and strong and attending school. This, so far as I know, is the only living child in Chicago born by postmortem Cæsarean section.

Dr. George Schmauch: In Germany we are taught that the physician is obliged to do the postmortem Cæsarean section. I remember one case where I did it, but I was not able to get a living child. I know very well that if I had not performed the operation, I would have been severely censured. The law requires the attending physician to do a Cæsarean section on a dead pregnant woman, if he has the conviction that

the child is alive. If Dr. Bacon were in Germany and did not perform the operation in the case he reported, he certainly would have gotten into trouble, particularly when he had the conviction that the child was living.

About four or five hundred cases of this kind have been reported by a number of men together, with a percentage of twenty to twenty-five of living children.

DR. CHARLES E. PADDOCK: I always supposed that it was the physician's duty under such circumstances to do a postmortem section, especially if the child is viable and strong. I would perform the operation myself in such cases, limiting myself, however, to the one condition that the child be viable and strong.

DR. RUDOLPH W. HOLMES: Twice I have unfortunately been compelled to do a postmortem Cæsarean section. In one case I knew the baby was dead and had been so for a day or two. The second patient had an exophthalmic goiter and a mitral lesion. She died after the first inhalation of chloroform and I did a postmortem section.

I thought it was understood and recognized by the Roman law that any pregnant woman should be operated on if she died before the delivery of her child, no matter whether the child is dead or alive. I believe that this law would hold good in this country, and I would not hesitate a minute in such a case.

DR. GUSTAV KOLISCHER: The legal aspect of this question is peculiar. The law in all European states prescribes that it is absolutely the duty of the attending physician to do the postmortem Cæsarean section if the mother dies, thus giving the physician the right to decide whether the mother is dead. There is no time limit set by law as to when this operation should be done, so that the physician is not to judge as to whether the fœtus is dead or alive. The law assumes that the physician is competent to decide whether the mother is dead, but at the same time it prescribes that after the operation is done the uterus and abdomen must be closed because the woman might be alive, the physician having made a mistake. If the physician does not make the section, he is liable to punishment on account of misdemeanor. It is the intention of the law to treat the child in utero as a living child and to regard it as a misdemeanor if the surviving parent or nearest relatives prevent the physician from performing his duty, just as would be the case if the child were sick and proper medical attendance was not secured. Therefore, if the husband prevents the physician from performing the section, he is guilty of a misdemeanor.

DR. BACON (closing): The remarks by Dr. Schmauch and Dr. Kolischer show what the European sentiment is in this matter, as based on laws. As brought out in my paper, and also by Mr. Reichmann, our laws are different. In fact, we have no law on this subject, not even a court decision, so that the situation in this country is different from that in Europe. It is probable that if this case came into court the fact that there are such laws in Europe and that they date far back would have a bearing on the decision. Moreover, the fact that the ideas of the profession in this country come largely from European teachers and books would have considerable bearing.

I was a little surprised by the remarks of Dr. Schmauch in regard to the law in Germany. My understanding from reading Kleinhans' article was that in Prussia the section is left to the physician, but is not required. It is required in Austria and Bavaria and in other countries. Kleinhans may be mistaken or the law may have been changed. I do not know.

In regard to the culpability of the husband or anyone else interfering with the operation, Stumpf states that the husband cannot be punished because of opposition to the section. Just exactly what the basis of this statement is, I do not know, because Stumpf does not say whether his statement is founded on law or on decisions.

In regard to statistics, large collections of cases have not been made. Some of the statistics, especially the older ones, are very unfavorable, hardly five per cent of children living. I believe the fact that many cases are not reported, especially the unfavorable ones, makes it probable that the percentage of recoveries is very small. That fact led Fehling and Dohrn to look with considerable discredit on the operation, and it also justifies caution in the selection of cases. For that reason I believe that the rule I tried to outline is a justifiable one. The operation should not be done unless there is good reason to believe that the child is alive, and it should not be done later than twenty-five minutes after the death of the mother. There is no case on record where the child has lived later than twenty-three minutes. My case was somewhere in the neighborhood of twenty-five minutes and the heart was still beating when the child was delivered. It is very desirable that caution be exercised in doing the operation. It rather tends to discredit the operation and give its opponents a hold when it is done in cases where the child is known to be dead, or where a long time has expired since the death of the mother.

SOUTHERN SURGICAL AND GYNECOLOGICAL ASSOCIATION

TWENTY-THIRD ANNUAL SESSION, HELD AT NASHVILLE, TENNESSEE, DECEMBER 13, 14, AND 15, 1910. THE PRESIDENT, DR. W. O. ROBERTS, LOUISVILLE, KENTUCKY, IN THE CHAIR

THE IMPORTANCE OF PRESERVING THE GALL-BLADDER

DR. J. W. LONG, of Greensboro, North Carolina, stated that a critical analysis of 86 of his own operative cases had convinced him of the value of retaining the gall-bladder. Cholecystectomy should be done in the presence of new growths, especially primary carcinoma, also in gangrene when the whole thickness of the bladder wall was involved, but not otherwise, since he had had several recoveries following drainage for gangrenous mucosa of the bladder. Infection and empyema were only relative indications for doing cholecystectomy, most cases doing well under cholecystotomy. The cystic duct obstruction always present in empyema was gradually overcome under the beneficent influence of drainage, and after a varying interval of one to seven days, in one instance fifteen days, bile began to discharge through the duct. Stone impacted in the cystic duct was only a rare indication for cholecystectomy, the writer never having failed to remove the stone. Even perforation could not be considered an absolute indication for cholecystectomy, the writer reporting two cases which did perfectly well under drainage. Drainage was second in importance only to removal of stones. Removal of stones could not cure a pancreatitis, but drainage did. No organ in the body once badly damaged responded so effectually to drainage as did the gall-bladder. Drainage was the *sine qua non* for curing the patient of the widespread sequelæ of gall-bladder infection. It was prudent in doing a cholecystectomy to leave a forceps rather than a ligature on the cystic duct in order to provide for a free flow of bile should untoward symptoms arise. Embryologically, the bud for the gall-bladder and that for the larger portion of the pancreas developed together, as they grew and receded from each other their ducts remained joined. The relation of the two organs was very close anatomically and physiologically. The gall-bladder was not a storage pouch for bile, but rather was an expansion tank for the bile duct system. Its removal was always followed by dilatation of the ducts, even the nub of the cystic duct compensating for the loss of their expansion tank. Pure bile injected into Wirsung's duct caused pancreatitis, bile mixed with the bladder mucosa did not, a cogent reason for preserving this function. The only avenue through which to treat chronic pancreatitis present or in the future was the bile duct system, preferably through the gall-bladder.

DISCUSSION

DR. THOMAS S. CULLEN, of Baltimore, stated they had for several years made it a practice to drain all gall-bladders, except in those cases in which there was a suspicion of malignant disease, or where there was empyema of such a character that it was impossible to drain satisfactorily, where the danger of removing the gall-bladder was not as great as that of infection from drainage.

DR. HOWARD A. KELLY, of Baltimore, stated under no circumstances would he remove a gall-bladder that was apparently sound or even moderately diseased which evidently might easily recover with drainage. Again, he would not remove a gall-bladder where there was any suspicion of trouble in the common duct or any pancreatic disease. It was best to remove a gangrenous gall-bladder, or one that was suspected to be malignant.

DR. J. GARLAND SHERRILL, of Louisville, said there had been a tendency to do too radical operations in this region. He had saved a number of gall-bladders that were full of pus, by drainage. The reparative power of the tissues was very great and the opening became patent in a short time, and drainage of bile free.

DR. RANDOLPH WINSLOW, of Baltimore, stated he had operated on a case some time ago where the duct was evidently obstructed, although bile reappeared, it did not flow. However, in the course of time nothing but mucus came from the external opening, the gall-bladder was distended, and bile did not pass. There occurred stricture of the cystic duct which necessitated a second operation for the removal of the gall-bladder.

DR. R. E. FORT, of Nashville, said in those cases where they had a small, contracted, rigid, friable gall-bladder, not larger than the finger, in which drainage could not be instituted, he thought it not only proper but essential to do a cholecystectomy. There were cases occasionally in which they had common duct obstruction and

it became necessary to do cholecystectomy, but in other cases it was not necessary to do this radical operation.

Dr. Bacon Saunders, of Fort Worth, Texas, stated in these old chronic gall-bladders it was necessary to continue drainage sometimes for six weeks in order to get satisfactory results.

Dr. William B. Coley, of New York City, said when he removed a gall-bladder he instituted drainage in the cystic duct and this did as much good to the pancreas as if they drained through the gall-bladder itself.

Dr. Long, in closing, stated in gall-bladder surgery, as in all other surgery, it was largely a matter of personal equation in deciding what was the best thing to do in the individual case.

CHRONIC URETHRITIS AND CHRONIC URETERITIS CAUSED BY TONSILLITIS

Dr. Guy L. Hunner, of Baltimore, in a paper on this subject contended that certain cases of chronic urethritis and chronic ureteritis heretofore of obscure origin were due to tonsillitis. He recognized that the great majority of chronic urethritis cases were due to gonorrhœa, most of the cases of rheumatic urethritis of the older text-books being of this nature. Some cases could be traced to trauma and infection in childhood, or trauma and infection of non-gonorrhœal character in the newly married. Other cases might probably be due to onanism, and some might be classed as autoinfections, the short female urethra and the myriads of micro-organisms normally present in the outer orifices being factors that would make autoinfection probable.

After ruling out gonorrhœa and these rarer causes of infection, there still remained a certain large percentage of chronic urethritis cases, which, in recent years he had associated with the rheumatic diathesis. He asserted that in a large proportion of this class of cases the disease was due to infections or toxins from the tonsils, and the importance of this observation was appreciated only when we recognized that the urethritis could not be permanently cured until the tonsils were thoroughly extirpated. To substantiate his views, four cases who had had the tonsil operation were reviewed in detail, and several others not operated, were cited briefly. Of the four operative cases, two had been treated for months without appreciable permanent benefit to the urethra, whereas after removal of the tonsils, case 1 recovered. The recovery was prompt, and patient had been well for fourteen months, after having had bladder trouble eight years. Case 2, after removal of the tonsils, had an irritable spot in the base of the right fauces, which for seven months gave periods of sore throat accompanied by rheumatic symptoms in the knees and urethritis symptoms. For the past four months the throat symptoms had been absent, and the joints and urethra were apparently well. Case 3 had been treated in the hospital on two occasions in the past nine years, with prompt recovery from the urethral symptoms each time. On the last hospital visit in March, 1910, the tonsils were clipped with the tonsillotome, and the patient reported a return of all her symptoms soon after going home. Case 4 had a tonsillectomy after two urethral treatments, so no conclusions could be drawn in her case as to the futility of urethral treatments, without removal of the tonsils. She had apparently recovered after having had bladder trouble three years, although only four months had elapsed since the tonsillectomy. The various possible causes of ureteral stricture were discussed, and two cases were reported to illustrate the possible causal relationship of tonsillitis. The fact that acute prostatic abscess sometimes followed inflammation of the tonsils suggested a possible relationship between the tonsils and certain chronic urethritis cases in males. These cases were often associated with chronic prostatitis, in which gonorrhœa could be excluded as the cause, and for which no definite etiology had heretofore been obtainable.

DISCUSSION

Dr. J. M. Mason, of Birmingham, said it seemed that all of the cases reported had occurred in unmarried women in whom there was some possibility of nervous disturbance or reflex irritation of the urethra. He would like to ask Dr. Hunner whether he had had any cases in married women or in women whose sexual relations were normal.

Dr. G. R. Holden, of Jacksonville, Florida, asked whether the discharge in these cases contained pus cells as seen by the microscope.

Dr. Howard A. Kelly, of Baltimore, stated the wife of a professional colleague had been under his care for fifteen years. She had more or less malaise. Careful examination revealed pus in the urine in varying amounts, but so far as the local conditions were concerned the patient was without symptoms. She was in ill health. He catheterized and found pus came from the left kidney. He dilated the ureter on that side, washed out the kidney, she got better, and after a few months returned for further investigation and treatment. She had for twelve years been

troubled with rheumatism. She had enlargement of the joints. Last spring, on examining her, he found a large tender kidney with a good deal of pus in the urine. He drained this kidney and did a plastic on the semilunar ureteral valves. He cut down on the fascia at the end of the ureter and drained from the side. She continued to suffer with rheumatism through the summer, although she experienced some relief from the drainage in the side. This fall he took out the kidney and her rheumatism disappeared like magic.

Dr. John F. Oechsner, of New Orleans, said it seemed from the cases cited, without going into any other possible local infection, that the tonsils were at fault. He feared, however, that what had been said might lead to more or less universal tonsillectomy if the members of this representative body should regard the tonsils as always at fault in cases of urethritis, where the specific organism, the gonococcus more particularly, could not be determined. He would, therefore, make a plea to educate the practitioner to be more specific in determining the nature of a local infection, whatever it may be, and find out exactly where the focus of infection was.

Dr. Hunner, in closing, stated some of the cases he had had since the four he had reported were married women. These cases did not have pus in the urine. He stated they could not milk pus out of the urethra as they could in an acute gonorrhœal case.

THE BEST METHOD OF EXPOSING THE BLADDER FOR AGGRESSIVE OPERATIONS BY THE SUPRAPUBIC ROUTE

Dr. Howard A. Kelly, of Baltimore, read a paper on this subject. (See January issue of Surgery, Gynecology and Obstetrics.)

DISCUSSION

Dr. J. Shelton Horsley, Richmond, Virginia, stated for more than a year he had been using the Pfannenstiel incision as a routine measure in all suprapubic cystotomies, and he found it took very little more time than the ordinary incision and it left the abdominal wall in a much better condition afterwards.

Dr. Ernst Jonas, of St. Louis, Missouri, said the Pfannenstiel incision gave a very good view of the bladder. This incision had been advocated by Dr. Pfannenstiel for clean gynecological cases where there was no pus in the pelvis, and for cases in which the pelvis was badly infected.

Dr. Reuben Peterson, of Ann Arbor, Michigan, stated the Pfannenstiel incision was only suitable for clean cases. He had had a large experience with the transverse incision for shortening the round ligaments and for operations on the bladder, and if the wound should suppurate the objection raised by Dr. Jonas held good. While the technique demonstrated by Dr. Kelly was fine for clean cases, he could see objection to this incision in suppurative cases.

Dr. George H. Noble, of Atlanta, Georgia, stated he had made use of the tradsverse or Pfannenstiel incision quite frequently in cases in which he did not expect to encounter a septic process, both in placing the uterus in its normal position and in opening the bladder. A point he wanted to bring out especially was, that in this dissection you could increase the opening very materially and satisfactorily by making a section of the lower ends of the recti muscles, where necessary, and get a good view. This was particularly the case where they wanted to open the pelvis to go into the peritoneum, using this incision.

Dr. Alexander Hugh Ferguson, of Chicago, stated he could see how this method of exposing the inside of the bladder would be of great utility to those surgeons who practiced suprapubic prostatectomy, also in removing papillomata in avoiding the ureter. They must remember that there was no fascia behind the rectus muscle in this region, and that it retracted easily and acted as a bar to infection in the operative area.

Dr. R. C. Bryan, of Richmond, Virginia, read a paper on "Stone in the Ureter," which is published in this number. (See p. 134.)

THE EARLY DIAGNOSIS AND TREATMENT OF RENAL TUBERCULOSIS

Dr. J. M. Mason, of Birmingham, reported a case in which there was extensive tuberculous disease of the left kidney, with symptoms referable only to the bladder. He said: Renal tuberculosis was, in the beginning, a unilateral infection, and might remain so for a long time. For successful treatment the patient should reach the surgeon while the disease was still confined to one kidney. The early symptoms were rarely referred to the kidney, but in a large percentage of cases were vesical and might remain so for many months. For the diagnosis, repeated examinations should be made for the detection of tubercle bacilli in the urine, and often the inoculation of guinea pigs should be resorted to. The cystoscope and ureteral catheters must be made use of to ascertain the condition of the

bladder and to determine which kidney was the seat of disease, also for the purpose of ascertaining the organic and functional condition of the second kidney. The treatment consisted of prompt nephrectomy followed by the best hygienic, climatic, and dietetic management.

CÆSAREAN SECTION WITH SPECIAL REFERENCE TO THE TIME OF OPERATION AND ITS TECHNIQUE

Dr. Lewis S. McMurtry, of Louisville, Kentucky, said the operation should be performed with the same deliberate care and expedition as were observed in other abdominal operations. There seemed to be a general impression on the part of surgeons that exceptional rapidity bordering on haste should characterize the steps of the operation. There was no valid reason for this. Davis made the abdominal incision above the umbilicus, and the uterine incision just below the fundus of that organ. The speaker did not believe the site of the incision was of essential importance. The abdominal wall at the full term of pregnancy was thin and relaxed easily. As soon as the abdominal incision was made and the uterus exposed, long gauze pads wrung out of warm salt solution were placed within the abdomen to hold back the omentum and intestines and protect peritoneal surfaces while the uterus was being emptied and closed. With the demonstrated results of Cæsarean section as now obtained, the scope of the operation must necessarily be widened and its application greatly extended. What was most needed at the present time was an active interest on the part of all abdominal surgeons, and such a campaign of education as was successfully applied some years since in behalf of early operation in other conditions requiring prompt surgical intervention. It was established that the primary Cæsarean operation in skilled hands had a mortality quite as low as uncomplicated ovariotomy and clean hysteromyomectomy. With repeated examinations cervical dilatation and application of forceps carried out with crude and desultory observance of aseptic precautions, the mortality of abdominal hysterectomy was necessarily increased. The co-operation of the surgeon and the general practitioner was necessary to currect this fatal error.

DISCUSSION

Dr. E. Gustav Zinke, of Cincinnati, stated that if the mortality of Cæsarean section to-day was too high it was because of carelessness or indifference on the part of those who took obstetric cases and did not give them the attention they deserved. When a woman engaged their services with a view to attending her in her approaching confinement they should study the case carefully. It was here where a mistake was made. Because a woman had a good shape, was otherwise in good health, and there was no indication of any difficulty, she was permitted to go until the time of labor had arrived, and the obstetrician in very many instances had not the remotest idea of the capacity of her pelvis or of the attitude of the fœtus within the uterine cavity, and it was because of lack of this knowledge that the woman went into labor, and then labor was protracted from some cause or other, the difficulty of which was detected by the consultant, who saw the necessity of performing hebosteotomy, Cæsarean section, version, or craniotomy, as the case might be. His sole object in speaking on this paper was to caution the profession anew, and he would do it on every possible occasion, that every case of pregnancy should be thoroughly studied before the woman went into labor. The physician should know all about her pelvis, about the attitude of the fœtus, as well as the condition of her kidneys, heart, liver, etc.

Dr. Ernest S. Lewis, of New Orleans, said he thought the obstetrician should thoroughly examine every woman whom he expected to confine, not only to determine the presentation of the fœtus, but to correct any malpresentation, if it was possible; also to determine the condition of the pelvis by proper mensuration. Statistics showed that Cæsarean section, the primary operation, was not attended with any more gravity than the removal of an ovarian tumor. He fully agreed with the author of the paper in regard to that, and that the danger was proportionate to the length of time the woman had been in labor, whether examined or not. There was greater danger of infection if frequent examinations had been made or if instruments had been used.

Dr. Reuben Peterson stated if there was one subject in the whole range of medicine that had been neglected in the last twenty years it was obstetrics. This could be explained in a way by the greater pecuniary rewards which had accrued to abdominal and other kinds of surgery, so that it had made the obstetric feature more or less anomalous in this country. Many men graduated from the medical schools without an accurate idea of what to do for a woman during pregnancy, or how to size up a diffcult case before labor. The specialist was usually called in after the practitioner had failed to deliver the woman by the natural way. The time was coming when the operation of high forceps would not be taught in the medical schools as an obstetric procedure.

High forceps were put on when the head had not entered the pelvic inlet. There was some disproportion between the head and the superior strait, and in his opinion Cæsarean section gave far better results to the woman and to the child than did the operation of high forceps.

DR. MCMURTRY, in closing, stated the attitude of the profession towards Cæsarean section was a very serious one, and it should be corrected. It was the highest function of an association like this, whose expressions went out to the profession and were looked upon as authoritative, to correct erroneous impressions, and the erroneous impression he alluded to was the general attitude of the great body of medical practitioners, namely, that Cæsarean section should not be done until the patient had been examined by two or three men; that these examinations were made with the most perfect observance of asepsis, and all ordinary means of delivery had been tried on the patient for hours. The important point they wanted to impress was to get the great body of the profession to recognize early, if not before labor, early after labor had begun, that it was a case suitable for Cæsarean section.

INTUSSUSCEPTION

DR. STEPHEN H. WATTS, of Charlottesville, Virginia, reported two cases of intussusception in the adult, one of which was due to multiple adenomata of the intestine, and the other to a sarcoma of the cecum. In the first case it was found necessary at several operations to perform two resections of the intestine with lateral anastomosis, two other lateral anastomoses, and seven enterotomies for removal of the growths. The patient was perfectly well when seen about a year after the last operation. In the second case, after reducing the intussusception, the sarcoma was removed with an elliptical portion of the wall of the cecum, and the patient made a good recovery. After reporting these cases, Dr. Watts discussed in some detail the symptoms, diagnosis, and treatment of adenomata and sarcomata of the intestine.

COMPLICATIONS DUE TO OPERATIVE PROCEDURES

DR. L. E. BURCH, of Nashville, Tennessee, mentioned the accidents following operative procedures in his own work, and referred to accidents occurring in the work of other surgeons. He laid stress on the following points:

1. Many of the accidents following operations were preventable, while others were not.
2. No operation should be advised, however trivial in character, unless there is positive pathology to indicate its performance.
3. No operation should be carried out, either under local or general anæsthesia, until a careful history of the case was obtained, including a thorough physical examination, with urinary and blood findings.
4. Better results would be obtained and fewer accidents would happen if patients were given preliminary treatment before operation.
5. Surgeons should never state to patients that any operation was free from danger.

FORMATION OF A NEW VAGINA

DR. ALEXANDER HUGH FERGUSON, of Chicago, reported three cases. In the procedure presented the author did not claim to produce a normal vagina, still in two of the three cases reported a vagina had been formed which yielded satisfaction. The third case was not yet married, but there was no doubt but that the vagina would prove as efficient as the other two. The technique of the operation varied slightly in each case, but the underlying principles were the same, namely, first to utilize the available mucous membrane; second, to form three flaps; third to tunnel through the peritoneum behind the bladder and in front of the rectum, dissecting the peritoneum from both structures without opening the peritoneal cavity; fourth, to invert the flaps into the tunnel thus formed and suture them in place with catgut. The lateral flaps included the mucosa of the labia minora on either side, exercising care not to interfere with the mucous membrane in connection with the clitoris and meatus urinarius. The central flap was cut as thick as possible in order not to interfere with nutrition. The lateral flaps were cut with the same precaution in mind. The fact that the flaps were not sutured together rendered the cavity dilatable to an ideal extent. Horsehair was used to close over the denuded areas. A roll of gauze about seven inches long was anointed with sterile vaselin and zinc oxide and inserted into the plastic vaginal canal. The external end spread like a flange and was held in place by a firm pad. It must not fit too tightly. As to the after treatment, the initial dressing must not be withdrawn for six or eight days. The parts must be kept as aseptic as possible. The internal stitches were catgut and might be left to become absorbed. The horsehair should be left in place for two weeks. Absolute cleanliness without antiseptics was of primary importance. The patient must remain under observation for at least three months.

A POSITION FOR SAVING TIME IN COMBINED ABDOMINAL AND PELVIC OPERATIONS

DR. A. C. SCOTT, of Temple, Texas, described this position as follows: By use of any metal knee-holder which fits comfortably in the popliteal space, one might secure a combined exposure of the abdomen in an elevated position, and at the same time exposure of the pelvic outlet, permitting the use of self-retaining specula, if desired. This was accomplished by having the popliteal knee-holder hinged on a short upright bar which was broadened and slotted at the lower end to slide, with a set screw, upon a horizontal metal bar, which in turn was fixed to a strong cylindrical upright bar, sliding in a viselike clasp at the side of the operating table. The sliding upon the horizontal bar allows adjustment for the varying lengths of patients' thighs. The cylindrical sliding upright bar at the side of the table permits the thighs to be moderately flexed or fully extended, abducted, or adducted at will. Before starting the anæsthetic, the patient's hips are brought beyond the edge of the table and the limbs placed upon the knee-holder. A piece of bandage loosely wound about each foot and ankle was tied to a convenient point below the corner of the movable part of the table to prevent extension of the leg, another was placed above each knee to prevent elevation of the knees, thus securely holding them in their respective knee-holders. Any modern operating table will serve the purpose for these attachments and enable one to secure the desired combined position if it has a pivotal point about the center permitting the entire surface of the table to be raised and lowered at will. He used a modification of the Markoe table, which operated with wheel and ratchet and could be changed by the anæsthetist with perfect ease. After the patient was in position and the anæsthetic was begun, the foot of the table was lowered some five or six inches for convenience or completing the preparation by thorough rinsing of the abdomen and vagina. This was done and the table returned to the horizontal plane without again having to take hold of the patient with the hands.

The advantages of this position were:

1. Where two operators were working together with plenty of assistants at their command, the time required for many complicated operations might be reduced to a marked degree, and often as much as fiftv per cent.

2. By changing the axis of the table, the pelvis and the abdomen might be lowered, if desired, or elevated to secure the advantages obtained by the Trendelenburg position at any stage of an abdominal operation, without interfering with work simultaneously being done upon or through the pelvic outlet.

3. All the advantages of the Trendelenburg position might be obtained without its disadvantages.

4. All the advantages of the dorsal position for pelvic outlet work were obtained without flexing the thighs upon the abdomen or otherwise interfering with work required through the abdominal wall.

5. The final preparation of rinsing both the abdomen and vagina was easily accomplished while the anæsthetic was being given without having to lift or disturb the patient again.

6. By wide abduction of the extended thighs during abdominal operations room was made for a second assistant to stand with advantage for sponging, ligating, and retracting, equal to the one standing directly across the table from the operator.

THE TREATMENT OF ANTEFLEXION

DR. HENRY T. BYFORD, of Chicago, stated he did not offer a new treatment. He asserted that the newest methods were not satisfactory, and selected for consideration one of the old methods and gave the essentials and technique that had given success in his practice. The method consisted in keeping the cervix overdilated for six months to a year, and in the prevention, during the second year, of contraction sufficient to cause symptoms. The advantage of this method over all others consisted in keeping the uterus under the influence of the treatment until the cervix developed to a size that would not interfere with uterine drainage and cause symptoms, when the case could be compared to those of symptomless rigid anteflexion that we sometimes observed in multiparæ. He claimed that the cutting operations favored atrophy of the cervix and were irrational in most cases because the cervix was already deficient in development.

COMPLETE TRANSVERSE DESTRUCTION OF THE SPINAL CORD

DR. RANDOLPH WINSLOW, of Baltimore, read a paper in which he reported a case of complete transverse destruction of the spinal cord from pistol wound without penetration of the spinal canal; with a consideration of concussion as an etiological factor in the production of this lesion, and of the question of suturing the cord when it was completely divided. He narrated two cases of pistol wound of the dorsal vertebræ in which the cord was not injured by direct impact of the

bullet, but in both of which paralysis and the usual signs of a transverse destruction of the cord immediately supervened, proving fatal in one case, which came to autopsy and the bullet was found lodged in the second dorsal vertebræ, but not penetrating into the spinal canal or impinging on the cord. The other case presented similar symptoms and was submitted to laminectomy, but the cord was not divided nor could the missile be found. He was still living, but was in a very precarious condition, with absolute paralysis below the eighth dorsal vertebra. These cases were thought to have been due to concussion of the cord. The views of a number of military surgeons and authors were quoted in regard to the production of the lesions of the cord by concussion without direct impact on the spinal cord, who were unanimous in the belief that such injuries did occur. The question of suturing the severed spinal cord was discussed, and several operations of this character in the hands of other surgeons were mentioned. The results had not been good, and physiologists declared that regeneration of the severed spinal cord was impossible. Be this as it may, marked improvement followed in one case, and there was no reason why the cord should not be sutured in appropriate cases. Dr. Winslow summed up his views upon these questions as follows:

1. That serious and even fatal lesions of the spinal cord might be produced by concussion, without direct impact.

2. That in gunshot injuries with a probability of a complete severance of the cord, laminectomy should be performed, foreign bodies and clots removed, bleeding arrested, and if the cord had been divided, the separated ends should be approximated with sutures.

3. Care should be exercised not to destroy any nerve fibers or tracts which might still be intact.

AN UNUSUALLY LARGE OVARIAN CYST

Dr. J. Shelton Horsley, of Richmond, Virginia, read a paper on this subject. (See p. 115.)

DISCUSSION

Dr. Thomas S. Cullen, of Baltimore, Maryland, stated four and a half years ago he saw a patient who weighed 174 pounds. She was supposed to have had an ovarian cyst, but it turned out to be a fibroid tumor. They operated, removed an eighty-nine pound fibroid, and the patient immediately after operation weighed eighty-five pounds. After a week in the hospital, when edema began, she weighed eighty and a half pounds, and although she developed bed sores, she promptly recovered. In that case after operation the ribs stuck out six inches and the recti muscles which lay high up on either side gradually came together until at the present time they were only two centimeters apart.

Dr. Alexander Hugh Ferguson stated he was called to a small town near Indianapolis to see a woman with a large ovarian cyst. She had carcinoma of the left breast and gall-stones. She was in a bad condition. He introduced a small trocar and canula, which went into a cyst that was quite watery. The trocar was left in place for twenty-four hours. The next day she was able to eat, a thing she had not been able to do for two weeks, and was able to swallow. Her heart, which was bad, improved. He passed a large trocar in another direction through the same opening, and allowed it to remain for another twenty-four hours, and then she was brought to Chicago, and three days later he operated and at one sitting removed the cyst, the left breast, and 1,250 gall-stones from the gall-bladder, and she recovered.

A MALIGNANT INTESTINAL GROWTH, REQUIRING THE REMOVAL OF AN UNUSUAL NUMBER OF ABDOMINAL STRUCTURES

Dr. Thomas S. Cullen, of Baltimore, in his paper reported the case of a patient, 56 years of age, very pale and emaciated. Within a few hours prior to operation her weight had been reduced from 120 to 85 pounds. Pelvic examination revealed a growth plastered on the posterior surface of the uterus. This almost filled the pelvis and felt very much like a myoma. The patient, however, gave a history of flattened stools occasionally associated with diarrhœa, and a malignant intestinal growth was suspected. On opening the abdomen Dr. Cullen found a growth involving the lower portion of the descending colon, also a loop of small bowel, and extending out and forming a tumor mass in the mesentery of the small bowel. Intimately blended with this tumor mass was the uterus. The appendix was also involved. As the patient's condition was very poor the operator hesitated to do anything, but the family physician said that she could only live a few days in her present condition, and that she was suffering a great deal. As no secondary nodules could be found either in the mesentery, in the lymph glands, or in the liver, removal was undertaken. The uterus was amputated through the cervix and with the tubes and ovaries turned up on the surface of the tumor. The appendix was next amputated, carefully covered over with gauze, and also turned up on the

tumor. About three feet of small bowel and almost a foot of large bowel were then clamped off and the mesentery of the small bowel containing the tumor, gradually tied off. All the structures mentioned were removed in one piece, as it would have been absolutely impossible to separate the uterus without entering the cancerous mass and opening up the bowel. It was possible to remove the entire mass without soiling the peritoneum. The four ends of the bowel were closed. A lateral anastomosis was then made between the small bowel and the cecum, and as the descending colon had been redundant it was possible to do a lateral anastomosis between the descending colon and the sigmoid. A drain was laid in the pelvis. The specimen was exhibited. The patient made a very satisfactory recovery and was at present in good health. The ultimate outlook was not a favorable one.

ANEURISM

Dr. J. Garland Sherrill, of Louisville, Kentucky, reported a case of aneurism, and described a new method of ligature of the left subclavian. From a study of the reported cases and his own work, the following conclusions were drawn: That ligature of the subclavian artery in the first portion of the right side showed a higher mortality than on the left. This was probably due in part to the short distance between its origin and the first branch, and also to its close relation to the pneumogastric nerve, thoracic duct, and the internal jugular vein. The mortality of ligature in the second division is 55.5 per cent; in the third division about 50 per cent. The mortality was greater when ligature was done for injury to the vessel than for aneurism. With present methods the mortality of ligature in any portion of the subclavian should be greatly reduced, as was shown by recent results of Halsted, Schumpert, Jungst, and Curtis. Distal ligation had not proven satisfactory. When the aneurism was situated high on the axillary artery or upon the distal portion of the subclavian, the anterior operation should be employed when the vessel was accessible. The method here described was offered for the treatment of those cases in which the aneurismal tumor encroached upon the tissues of the neck in such a way as to prelude the possibility of ligation by the anterior method. He had found that at the origin of the left subclavian from the arch of the aorta there was no danger of including the pneumogastric nerve in the ligature or of damaging the thoracic duct.

Dr. John R. Wathen, of Louisville, Kentucky, read a paper on "Goiter Operations." (See January issue of Surgery, Gynecology and Obstetrics for this article.)

COLLAPSE OF THE TRACHEA WHILE PERFORMING THYROIDECTOMY

Dr. T. C. Witherspoon, of Butte, Montana, said that during the last fourteen months he had twice had the trachea collapse while performing thyroidectomy for exophthalmic goiter. The predisposing cause of collapse of the trachea was the anatomical defect in the rings posteriorly. This allowed the lateral walls to approach closer under pressure and to change the cross section of the tube from a circle to an oval with its long diameter anteroposteriorly. Another factor influential in starting a collapse was the proximity of the recurrent laryngeal nerve to the thyroid gland. It was possible that more or less softening occurred from the toxic effects of the gland secretions. The one prophylactic measure which he suggested as a means of avoiding pressing upon the trachea was a para-sterno-cleido-mastoid incision. This enabled the operator to raise the gland out of its bed without medianward pressure of appreciable degree. No doubt a collar incision with enucleation from between the sternohyoid and sternothyroid muscles of either side necessitated considerable pressure upon the trachea. While working out the problem of removal of the thryoid under local anæsthesia, he found it very much easier to do so by the paramuscular than by the collar incision. Manipulation was easi r and discomfort minimized. He experimented upon the cadaver in developing a technique and removed over twenty goiters under local anæsthesia before using a general anæsthetic. This was excluding his first case operated upon in the early nineties, to which chloroform was given. Of late years he had used the collar incision, possibly modified slightly, but he was rather of the opinion that his former plan of paramuscular incision gave a better field, made operating easier, and did not leave an ugly scar. He believed this incision would prove a valuable prophylactic against tracheal collapse.

CATHETERIZATION OF THE COMMON DUCT AS A PRACTICAL AND EFFECTIVE UPPER ROUTE FOR ENTEROCYLSIS MEDICATION IN TOXIC BILIARY CASES (M'ARTHUR'S PROCEDURE).

Dr. Rudolph Matas, of New Orleans, related his experience with this operation and said it was a conclusive demonstration of the good effects of this mode of procedure. It convinced

him that it constituted one of the most valuable therapeutic assets in dealing with the dangerous postoperative complications of biliary cases. Since his first experience, he had had occasion to try it in another case of choledochus drainage after cholecystectomy or gangrenous and perforated gall-bladder. In this case, notwithstanding the excellent effect on the circulation, of the duodenal infusion, which was liberally applied, the patient succumbed on the fifth day from the effects of general peritoneal sepsis and exhaustion due to secondary pulmonary infarcts. He had also applied it in three other cases, two referred to him by other surgeons, of persistent biliary fistula, after cholecystectomy for multiple calculi and cholecystitis. In these cases he had been surprised by the rapid cure of the fistulæ after repeated catheterization of the biliary tract, including the duodenal orifice of the common duct. In no case had he had occasion to apply the simple procedure recommended by McArthur, which was to connect a saline drip to a drainage tube in the gall-bladder, thus allowing the water to find its way into the duodenum via the cystic duct. This was a very simple performance; but in all his cases he had preferred to inject the fluid directly into the duodenum by introducing a catheter through the gall-bladder opening into the common duct and then into the duodenum. For this purpose, he had found nothing so effective as a ureteral catheter beginning with a fine bougie and gradually dilating with the catheters until the number three of the French scale had been reached.

SOME SUGGESTIONS RELATIVE TO THE PREPARATORY, OPERATIVE, AND POSTOPERATIVE TREATMENT OF CASES OF ACUTE INTESTINAL OBSTRUCTION

Dr. John Young Brown, of St. Louis, Missouri, stated in this paper that an analysis of the records of 59 cases of acute intestinal (mechanical) obstruction, coming under his care, with the view of ascertaining the treatment received in each case prior to operation and the bearing this treatment had on the mortality, had convinced him that the general profession had yet to appreciate that acute intestinal block was one of the gravest and most disastrous surgical emergencies, and that the outcome of a given case depended largely upon the time elapsing between the development of the condition and its relief by surgical interference. Of the fifty-nine cases recorded, twenty-seven required primary resection for gangrene of the bowel. All of these cases save one resulted from strangulation due to hernia, the exception being due to a gangrenous intussusception. Of these 27 cases, five died, giving a mortality of a little over 20 per cent. In 12 cases the formation of an artificial anus was necessary. Three of these were for strangulated umbilical hernia, four for strangulated inguinal hernia, and five were for acute obstruction due to malignancy. Of these 12 cases, six died, giving a mortality of 50 per cent. Twenty cases of strangulated inguinal hernia in which the contents of the sac were such that it could be returned to the abdomen resulted in the loss of one case, a mortality of five per cent. The total mortality in the 59 cases was a little over 20 per cent, a mortality entirely too high and largely due to conditions avoidable. The history of each case without a single exception showed that temporizing methods were resorted to prior to operation. He illustrated this by selecting two cases at random from the list, one operated on fifty-two hours after strangulation, the other 72 hours. Gangrenous bowel was found in each. Taxis, cathartics, and morphin, with hot applications to the abdomen had been used in each case, the cases being referred to operation as a last resort. That the general profession still used such methods was not to be wondered at. Surgery, to be successful, must recognize two factors always present in acute intestinal blocks. First, and least important, was the mechanical block in the bowel, the actual obstruction. The second, and incomparably the more severe, was the septic absorption from the distended, congested, and perhaps ulcerated bowel above the place of stoppage.

After urging careful preparation of the patient with particular attention to the removal of the stomach contents by means of the stomach tube, he described a method of draining a distended bowel above after the constriction was relieved. In the treatment of gangrenous bowel found in the sac of a femoral hernia, he strongly advocated the use of a supplementary abdominal incision as possessing many advantages when it became necessary to resect the gut. In discussing the postoperative treatment of such cases, he advocated frequent washing of the stomach, the withholding of food by the mouth, and the use of salt solution both under the skin and in the rectum, and he condemned in strong terms drugs in the way of morphin and strychnin.

In cases where an artificial anus had been made, he urged the importance of attention to the passive bowel. He illustrated with the report of two cases how failure to attend to this point in the after treatment could result in a contracture

of the small bowel to such an extent that it would complicate the work of restoring the intestinal continuity.

CYSTS OF THE PANCREAS

Dr. Rufus B. Hall, of Cincinnati, detailed his further observations on this subject. He reported to the association a case of cyst of the pancreas in 1907, and now reported another case of equal interest which emphasized the great importance of early operation in these cases.

PRESIDENT'S ADDRESS

Dr. W. O. Roberts, of Louisville, delivered an address which was literary rather than scientific, and dealt biographically and historically with the names and achievements of the prominent men who practiced surgery in the South before, during, and after the Civil War. It covered the period of years between 1806 and 1892, from the pioneers of the first two decades of the nineteenth century, to the few who survived and did work in the last two decades. These names might be divided into two, perhaps three groups. First, the pioneers; second, the general surgeons; third, the founders of the specialties. In the first are Walter Brashear, Ephraim McDowell, Charles McCreary, and Benjamin Winslow Dudley. These the author ranked as pioneers in American surgery, one of whom, Dr. McDowell, was an epoch-making surgeon. The others in early days were conspicuous in the surgery of the South, and did marked and original work, adding much to the medical fame of Kentucky, which was the field of their labors. They were all accomplished physicians as well as able surgeons, and with wonderful industry, learning, and art, practised successfully medicine in its three great specialties, as laid down by Hippocrates, namely, medicine, obstetrics, and surgery. In those days little beyond minor surgery was done by the country doctor, and the physicians of the larger towns and villages sent their more important cases to the cities, where the men named performed the necessary operations. The specialties of surgery during that period were merely taking form, or being slowly differentiated, and it might be said that these men, while practising general medicine and doing class surgery, did much of the work now done by specialists, and in short, helped to form and differentiate the specialties. Some of them indeed were its real pioneers. The list being a long one, Dr. Roberts selected a few only for special comment. They were: Hunter McGuire, Paul F. Eve, W. T. Briggs, Warren Stone, J. Marion Sims, Samuel D. Gross, and David W. Yandell. He gave a detailed biographical sketch of each of these surgeons. The speaker's peroration was reflective, retrospective, and eloquent.

CANCER OF THE UTERUS

Dr. Reuben Peterson, of Ann Arbor, Michigan, described the technique of the radical abdominal operation for uterine cancer, based upon an experience with forty-four cases, which appears in this issue of Surgery, Gynecology and Obstetrics. (See p. 152.)

Dr. Willard Bartlett, of St. Louis, Missouri, presented an interesting series of lantern slides of distinguished surgeons of Great Britain, of the surgical clinics visited, and of the operations performed by these surgeons, as witnessed by the members of the American Clinical Society.

VOLVULUS OF THE CECUM

Dr. Horace J. Whitacre, of Cincinnati, reported four cases of volvulus of the cecum, and gave a brief statement as to the nature and frequency of the lesions. In case one, a very movable cecum and ascending colon had passed over in front of them completely around, behind the mesentery of the small intestine, and reappeared in the right side. This patient had suffered three previous similar attacks of obstruction of the bowel which had been relieved by enemata and position. This patient recovered after operation. Cases two and three represented volvulus of the cecum and ascending colon alone, gangrene having occurred in both. One of these patients recovered. A fourth case suffered from volvulus of the cecum and ascending colon, was operated upon in a very few hours, and made a prompt recovery.

Volvulus of the cecum is among the least frequent causes of intestinal obstruction. It had occurred at all ages from 16 days to 80 years. The symptoms, as a rule, did not differ widely from those of intestinal obstruction from other internal cause. Some authors spoke of a false remission of symptoms after the first two or three days. The mortality was very high even in the cases operated upon (52.2%). The cases reported by the author seemed to present symptoms that were suggestive, namely, first, all suffered premonitory symptoms or previous attacks, second, all cases presented primary symptoms in the region of the cecum, and a localized distension first appeared at this point. The mortality in this group of cases was 25 per cent.

PYLOROSPASM

DR. STUART MCGUIRE, of Richmond, Virginia, said that spasm of the pylorus or pylorospasm was not a disease but a symptom. It might be caused by rapid eating, by indigestible food, by an ulcer or other lesion of the stomach, but was most frequently the expression of some remote abdominal disease. How appendicitis or cholecystitis caused gastric symptoms has never been satisfactorily explained. It was believed that irritation transmitted to the stomach through the sympathetic nervous system caused an excess secretion of hydrochloric acid. The resulting hyperchlorhydria caused spasm of the pylorus; the pylorospasm caused retention of food beyond the physiological limit, and finally there came motor insufficiency, food stagnation, and dilatation of the stomach. The most prominent symptoms of pylorospasm was a cramping pain in the epigastrium, which might last only a few minutes or might continue for several hours. In some cases the spasm might relax suddenly, in others it might terminate slowly and gradually. Some patients had attacks several times a day; others at intervals of weeks; and others still only once or twice a year. In the interval between attacks the digestion may be normal. During attacks peristalsis of the stomach was increased, but food could not pass through the pylorus, and often relief came only after vomiting. The patient usually dieted strictly, and lost flesh and strength steadily from starvation and autointoxication. In no other class of patients, with possibly the exception of epileptics, was it necessary to be so thorough in preliminary examination and so patient in postoperative treatment. The real cause of the condition must be found, and after it had been removed the patient must be systematically treated until the hypersensitiveness of the pyloric muscle was relieved, and its spasm habit overcome.

After reporting an interesting case, Dr. McGuire emphasized the following points:

1. The necessity of differentiating between gastric symptoms due to organic disease of the stomach and those reflex from other organs.

2. The impropriety of doing a gastroenterostomy for spasm of the pylorus.

3. The advisability at the time of operation of examining all abdominal organs and correcting every abnormality, lest the obvious might not be the real cause of the symptoms.

4. The importance of the postoperative and posthospital treatment of patients to overcome the spasm habit of the pyloric sphincter.

TUMORS OF THE JAW

DR. WILLIS F. WESTMORELAND, of Atlanta, Georgia, presented the pictures of a type of tumor that so far as his clinical experience went had practically disappeared. He had not seen one in years. This type of tumor seemed to have occurred almost exclusively in the negro. In 38 cases operated upon by his father, only one was white. In the five cases occurring under his observation, all were in the negro. Among us these cases were known as fibrocystic tumor; this title very closely described the gross clinical appearance of the tumor. In reviewing the literature of this subject Dr. Westmoreland said: "I am not able to place it, though it seems to conform more closely to the species of follicular odontoma of the genus odontomata in Bland-Sutton's classification. I would class it as an anomalous form of this species. I should judge they belong to the follicular rather than the epithelial odontoma, although they have never shown malignancy, while the epithelial type occasionally did. Clinically the tumors presented a uniformly well rounded mass, the surface of which felt hard and dense to the touch. Firm pressure upon the tumor with the fingers would always at some point elicit a distinct crackle, that was characteristic, as in a way diagnostic, though not differentially so, as occurred in other species of odontoma.

In a research of the literature of tumors of the jaw, which up to a few years ago were classified under the generic term of dentigerous cysts, the essayists had probably had the same trouble as he had, seeing them in their later development and being unable to properly classify them. But in the negro one fact seemed to be true, and that was, no matter what the original type, the later development was always along the same line.

TRANSFUSION IN PELLAGRA

DR. H. P. COLE, of Mobile, Alabama, presented a review of twenty cases of this disease, and then drew the following conclusions: In the transfusion of twenty cases of pellagra they had found no ill effect resulting directly from the operation. They might safely resort to transfusion in the severe type of case steadily retrogressing, under approved therapeutic procedures. They had noted no advantage in the employment of a donor who had recovered from pellagra, as compared with the donor who had never had pellagra. There was apparently no advantage in the use of a relative for a donor as compared to the use of a non-relative. The recoveries following transfusion in the grave type of cases (60%) com-

pared most favorably with the recoveries (10% to 20%) in the same type of cases in which other therapeutic measures were employed. The employment of transfusion in the terminal stages of pellagra must be undertaken with a full knowledge of the difficulties and dangers of the operation. Without careful selection of the cases and unprejudiced conclusions, this procedure would fall into an undeserved illrepute.

THE CAUSAL RELATIONSHIP BETWEEN INJURY AND CANCER

Dr. William B. Coley, of New York, stated that in a previous paper (Annals of Surgery, March, 1898) he published an analysis of 170 cases of sarcoma that had come under his personal observation, and stated that no clinical feature of the disease had impressed him more strongly than the frequent association of trauma with its early manifestations. In 46 of these 170 cases there was a definite history of antecedent trauma. Since this paper was written he had observed 740 additional cases of sarcoma, making a total of 910 cases. In 236 cases (26%) there was a definite history of antecedent trauma. The interval elapsing between the injury and the development of the trauma was less than two weeks in 63 cases (27%); less than a month in 97 cases (42%); tumor occurred within the first six months in 137 cases (60%). The disease originated in the bone in 111 cases (47%) and in the soft parts in 125 (53%). In making a study of all his cases of carcinoma, he presented an analysis of 125 cases of carcimona of the breast. In these there was a definite history of previous injury in 52 cases, or 41%. In five of these the tumor was noted within a week after the injury; in 12 cases within the first few weeks; in 19 within the first month, and in 36 within the first six months. He further presented three cases that had come under his personal observation, which fulfilled the strict, scientific test which Segone required, namely, that a medical examination had been made of the parts by a competent surgeon prior to the accident. He did not attempt to offer a complete explanation of the influence of injury upon the development of malignant tumors, but said that he personally believed more strongly with increasing experience that all types of malignant tumors were of extrinsic origin or parasitic.

The following papers were also read: "Hydatid Cyst of the Liver, Successfully Treated by Operation," by Dr. John C. Oliver, Cincinnati; "Diagnosis of Extrauterine Pregnancy," by Dr. E. Gustav Zinke, Cincinnati; "Omenopexy," by Dr. Maurice H. Richardson, Boston; "Tumors of the Breast," by Dr. William C. MacCarty, Rochester, Minn.; "Hypernephroma Arising in the Right Testicle," by Dr. James E. Thompson, Galveston, Texas; "Degeneracy, the Underlying Cause of Disease; How the Unfit Perish," by Dr. Chas P. Noble, Philadelphia, Pa.

OFFICERS

The following officers were elected for the ensuing year: President, Dr. Rudolph Matas, New Orleans; First Vice-President, Dr. Guy Leroy Hunner, Baltimore; Second Vice-President, Dr. J. Garland Sherrill, Louisville; Secretary, Dr. William D. Haggard, Nashville; Treasurer Dr. William S. Goldsmith, Atlanta.

Washington, D. C., was selected as the place for holding the next meeting; time, December, 1911.

WESTERN SURGICAL ASSOCIATION

TWENTIETH ANNUAL MEETING, HELD AT CHICAGO, ILLINOIS, DECEMBER 19 AND 20, 1910. THE PRESIDENT, DR. JOHN P. LORD, OMAHA, NEBRASKA, IN THE CHAIR

DESMOID TUMORS OF THE ABDOMINAL WALL AFTER OPERATION

DR. E. WYLLYS ANDREWS, Chicago, said he had seen only two cases of desmoid tumor in several thousand abdominal operations, both of which followed herniotomies. The rarity of this complication made it worth while to report these two cases. Most of those so far on record were of another type, and followed pregnancy or injury of the fascia above the inguinal region. Keloid was distinct from desmoid in belonging to the skin. Although in originating in scar tissue, as after burns or wounds, it always remained movable with the skin, and grew outward not into the deep fascia. True desmoids were found not in the skin or external cicatrix, nor in the muscles, but in the fascia and aponeurosis, especially of the abdominal wall. Nearly all the reported cases had been in women after repeated childbirth. Histologically desmoid tumors were pure fibromata of the hard white form, like fibromata of the other parts, showing coarse whirls of cut fibers macroscopically like uterine myomata and spindle cells miscroscopically with numerous fibrillæ between. The cells showed oval nuclei. Myomatous and even malignant degenerations might occur, as in similar growths elsewhere, but commonly they were benign. Desmoid tumors should be removed by operation inasmuch as the tendency was to grow larger and occasionally to start degenerative retrograde or malignant changes. Dr. Andrews then detailed the two cases that had come under his observation.

DISCUSSION

DR. J. CLARK STEWART, of Minneapolis, said the point of greatest interest in Dr. Andrews' report was the analogy which he possibly showed between this class of tumors, desmoid tumors, as to etiology with keloid. Keloid arose largely from scar tissue. If they could show that any class of fibroid tumors also arose from the seat of traumatism, it would be an important point in their etiology and in their analogy to keloid. He doubted whether the term desmoid should be used. Desmoid was an old clinical term which meant just one thing to him, and he thought it could be reserved for that one thing because it had no clear clinical or pathological meaning disassociated from that one clinical condition. Originally desmoids were tumors of the posterior sheath of the rectus muscle, and he must differ with Dr. Andrews that these tumors were found in the majority of cases in the upper part of the abdomen. The majority of the reported tumors he had run across had been found in the lower half of the abdomen, and both pathologically and clinically they had very marked characteristics. Clinically they grew inwardly, so that ultimately they became covered only by peritoneum. They attained considerable size. Quite a number of the reported cases of desmoid tumors were undoubtedly sarcomatous, and it was hard to differentiate a sarcoma under the miscroscope from the ordinary desmoid, and the after history of these cases had shown several times they were sarcomas, yet he did not think there was any question about the malignancy of desmoid tumors as originally described.

DR. A. E. HERTZLER, of Kansas City, Missouri, stated that he thought it was easy to fix the pathogenesis of these desmoid tumors. Any tissue, like the fascia of the external oblique, or any tissue which contained a large amount of the original substance, would, when irritated long enough short of suppuration, give rise to this fibrous tissue hyperplasia. One saw the same tumors subperitoneally about the abdomen. They were histologically very much the same. Histopathologically they differed from fibroma in that they were long, with large oval vacuolated cells, many round cells, and polynuclears. This point was sufficient to separate the desmoid tumor from the fibromatous tumor or any tumor analogous to sarcoma.

DR. ANDREWS, in closing, stated that as to the identity of keloid with desmoid, that keloid although it appeared in scar tissue never involved anything but skin. Keloids were confined to the skin, no matter how great the size they might attain, and were movable and free.

NON-SUPPURATIVE OSTEOMYELITIS

DR. J. CLARK STEWART, of Minneapolis, stated that three distinct clinical conditions might be classed under this title. First, cases of ordinary osteomyelitis where owing to the non-virulence of the invading germ or to unknown conditions increasing in resistance of the in-

dividual, no necrosis was caused. In such cases there was no pus, no sequestrum, but instead in certain number marked irritative reaction was set up, and there was great overproduction of bony tissue resulting in a thickened, dense, and painful enlargement of the bone attacked. These cases were quite common, regularly recognized, and properly treated. Second, cases of injury, generally fracture, where a small piece of bone was entirely separated and died, forming about it a closed cavity of dense new bone in which it lay until absorbed, but without suppuration. These cases differed entirely from those of the first class in that the irritant which caused new production of bone was not bacterial, or at least not primarily so, but a fragment of bone which remained practically aseptic. The third class, and the one to which he especially wished to call attention, differed entirely from both of the above by having no notable beginning, but an insidious onset although a febrile illness, and a slight injury respectively antedated by two years, the culmination of the disease by surgical interference. The disease was essentially chronic, but progressive and regularly misdiagnosed and treated as rheumatism. He had only seen the lesions present in the tibia, but this must be accidental, as it might as well occur elsewhere. The etiology seemed absolutely wanting, as the two cases narrated had nothing in common, while the pathology and symptomatology were identical. This third class seemed to be of a different type of chronic osteomyelitis not recognized by the test-books on surgery, the nearest approach to a description of them being called "chronis osteoperiostitis," which was certainly a misnomer, for in these cases the periosteum was regularly normal. Their characteristics pathologically were the transformation of the marrow cavity into a multicellular labyrinth filled with a tissue which macroscopically resembled red marrow. There was also a synchronous subperiosteal production of bone which resulted in a fusiform enlargement, the new bone being spongy and not dense. Symptomatologically they were characterized by insidious onset, so-called rheumatic pains, worse in damp weather and at night, with slight evening rise of temperature. While the two cases cited each gave a history of an acute causative agent, in neither could this be said to stand in an undoubted etiologic position as the local symptoms in both cases occurred over two years later. What would ultimately happen to a case of this kind without operation could only be surmised. Neither case showed any apparent change during the several months it was under observation, and it seemed probable that the bone would merely remain enlarged and painful until stirred up by a fresh injury or infection, when there would be suppuration and a sinus would be formed.

The diagnosis was easy after syphilis was excluded by the non-effect of the iodides. Tubercular osteomyelitis regularly caused cold abscess and sinus formation, while periosteal sarcoma was generally more rapid and could be eliminated by the use of skiagrams. Fusiform enlargement of a long bone, increasing very slowly in size with point pressure tenderness in various places over the enlarged bone, and slight afternoon temperature, gave a characteristic picture. The treatment was opening the bone and following the morbid process each way until normal bone was reached, cleansing, drying, and filling the cavity with Moorhof's wax or union by first intention.

DR. D. S. FAIRCHILD, of Des Moines, Iowa, stated he had seen a number of cases of this kind which seemed to have arisen from trauma or some injury which had been inflicted to the bone, with involvement of the periosteum to some extent, but the trouble seemed to extend throughout the entire shaft of the bone, the tibia being most commonly affected because it was more subject to traumatic influences. In the cases that had come under his observation the bone had been dense; that is to say, if the condition had existed for a long time, the bone became dense throughout its entire extent. In the young cases where the disease had not been progressing for a long time the bone was softer, and when the medullary canal was examined it was found almost entirely occluded by the proliferation of this bony tissue. These cases it seemed to him were more like cases of osteitis in which the inflammation had extended not only into the medullary canal and from the periosteum, but into the bone substance itself, and in the cases of long standing the bone had been very dense so that when a gutter was tunneled out, it required a considerable amount of chiseling to do so. While these cases were not very common yet they were common enough to constitute a matter of very considerable interest to the medical profession.

DR. W. W. GRANT, of Denver, stated that the diagnosis of the pathological condition under consideration was not made early, and that is why they did not see more of these non-suppurative cases of osteomyelitis. It was his opinion that if they would give them time, there would

be ultimately death of the part and either pus formed or sequestrum and an involucrum. They saw these cases formerly much oftener than now, because no one thought of operation until there were several sinuses leading to the canal. That was the usual method of dealing with these cases. To-day the diagnosis could be made earlier, and if it was, operation should be done earlier, when the patient would be saved several months and years of suffering, and would finally get well with a better leg and a better looking leg. It was necessary to exclude syphilis and tuberculosis especially in arriving at a proper diagnosis.

Dr. James E. Moore, of Minneapolis, stated that the principal difficulty in diagnosis was between non-suppurative osteomyelitis and chronic bone abscess. Therapeutic tests would eliminate syphilis. As a rule, syphilitic disease of the bone was bilateral, while non-suppurative osteomyelitis was usually unilateral. Chronic abscess of bone was likely to be limited to one end of the diaphysis, while the condition they were discussing affected the whole diaphysis. The history of these cases was that of a low form of inflammation, with gradual enlargement, the principal symptom being pain, more particularly at night. When they came to operate upon these cases they found the main part of the bone proper was eburnated, and the older surgeons amputated many of these limbs, showing how great the pain was at times. The modern treatment was that pointed out by the essayist.

Dr. Arthur T. Mann, Minneapolis, stated that in the last six months he had had two cases of this type of osteomyelitis in which he had used the Moorhof wax. One patient was a girl, 13 years of age, who had symptoms for two years. She had been kept under observation as a charity patient by another physician who spoke to Dr. Mann about her six months before he saw her. She had the usual symptoms of osteomyelitis in the lower third of the tibia, the pain being worse at night, and the temperature running up to 102° at times, but as a rule it was not as high as that. At the end of two years, when he saw her, she had a fusiform swelling at the junction of the lower third of the tibia which was very tender. She cried at night on account of the severe pain. On opening this there was a mass more dense than cancellous tissue, but much thinner than ordinary cortical bone, so that the cortex had thinned out and the medullary cavity had filled in. In the center of this there was pale granulation tissue. This condition lasted two years. This tissue was scooped out and the cavity filled with Moorhof's wax, and the usual closure of the wound made. There was healing by first intention. The pain stopped immediately following the operation. This was a case in which there had never been suppuration.

Dr. William H. Magie, of Duluth, Minnesota, said he would like to speak of a form of treatment which he adopted in a recent case. In this case the bone had been previously troughed by himself. Recurrence took place four or five months later, when Dr. Judd, of Rochester, Minnesota, operated. Later the patient returned to him with all the symptoms re-established. At the examination he found the tibia for fully eight inches enormously enlarged, so that the case really looked like one of sarcoma. He adopted the plan of not troughing the tibia, but chiseling down at the extreme end of this enlargement, splitting it, removing one-half of the tibia, then he applied skin direct upon the raw surface of the bone that he had left, after removing half of the diameter of the tibia fully eight inches in length. The wound healed perfectly by first intention, and the pain was relieved immediately. The patient had been well since and was working at his occupation in the woods as a foreman of a lumber crew of loggers.

Dr. A. E. Hertzler, of Kansas City, Missouri, said that in arriving at the pathogenesis of this condition he did not think they would make a mistake if they called it a desmoid tumor of the bone. If the tumor in Dr. Andrews' case had occurred in the medullary cavity the patient would have had this trouble they were discussing. In the chronic sclerosing type of bone disease they had a milder form of infection which produced an exudate which was capable of being organized, and not as in the more acute types which form an exudate which was not all organized. These conditions could be rather clearly followed out if one took the trouble of applying tinctorial chemistry to these various tissues. Rather unconsciously, he suspected, in the use of Moorhof's bone plug they were imitating in a measure a very mild type of infection. The iodoform produced an exudate which was capable of being thrown down into a fibrillar type of fibrin, and it was by active hyperemia acting on the substance which produced an exudate, after forming this type of fibrin, that healing was brought about.

Dr. M. L. Harris, of Chicago, stated that in the cases belonging to the subgroup which had been described by the essayist, there was no material enlargement of the bone. There was no condensation of the bony cortex. The disease usually affected the shaft of the bone. In the interior of the bone they found the red marrow

which Dr. Stewart mentioned. It was very soft, almost semiliquid in some cases. These cases were characterized by extreme pain. The most interesting and typical case of that kind he saw was a man who had been treated for syphilis. He had visited several watering places in Europe, but returned to this country without being relieved. His pain was so severe that he was obliged to take morphin to afford relief. There was extreme pain in the shaft of the humerus. These cases were sensitive when the bone was percussed by hammer or when deep pressure was made. All that was necessary to do in such cases was to open the medullary cavity, remove a portion of the cortex, relieve tension, and these cases recovered.

PRIMARY SARCOMA OF THE APPENDIX

Dr. Everett O. Jones, of Seattle, Washington, read a paper on this subject which appears in this issue of Surgery, Gynecology and Obstetrics. (See p. 131.)

DISCUSSION

Dr. A. E. Hertzler stated he had no hesitation in referring to this case as one of desmoid of the appendix, because he did not know what a desmoid was, and he did not know the nature of the appendix the essayist removed in this particular case. It was common to have microscopic pictures in these chronic gut inflammations which looked very much like sarcoma; hence the greatest care possible was necessary to make the differentiation.

Dr. S. C. Beede, of David City, Nebraska, said before hearing Dr. Hertzler's remarks he was under the impression that primary sarcoma of the appendix was a surgical curiosity, but now he was not sure that it was even a curiosity. Ever since Warren reported his case in 1898 there had been considerable investigation carried on with a view to finding malignant disease of the appendix. In the department of pathology of St. Mary's Hospital, Rochester, Minnesota, of 5,000 appendices removed for disease, there were only 22 cases of carcinoma of the appendix, and not a single case of primary sarcoma of the appendix developed.

Dr. William C. MacCarty, of Rochester, Minnesota, stated that he had had the privilege of examining about 5,000 appendices which were removed in Rochester, and since that investigation was made he had extended the list to about 10,000, and in all this series he has not seen one of sarcoma of the appendix. In the first 5,000 cases examined, as Dr. Beede had just stated, there were 22 cases of carcinoma of the appendix. Two of these he had previously diagnosed as endothelioma, which showed that the differential diagnosis between endothelioma and sarcoma was a difficult one. These were all very early cases, and in only one out of 17 was the serosa involved.

Dr. Donald MacRae, of Council Bluffs, Iowa, stated he had had eight or ten cases which from macroscopic appearances and the sensation imparted to his fingers appeared to be sarcoma of the appendix, yet he agreed with Dr. Hertzler. Unfortunately in the cases he had had the disease was not entirely confined to the appendix, but involved the cecum, and there were adhesions which tore away like frozen meat, and the mass had a sarcomatous feel.

Dr. Arnold Schwyzer, of St. Paul, Minnesota, stated that a few years ago, while on a visit to Switzerland, a patient presented himself with a large tumor of the diaphysis of the femur. Professor Kocher was to operate on this patient believing the tumor was malignant. Sections were taken from it and examined by Professor Langhans. These sections had to be frozen as a quick report was necessary. Professor Langhans made the positive report that the tumor was a round cell sarcoma. In the meantime, while waiting for the report, Kocher observed the tumor and found some grayish little dots here and there which appeared to him to be deteriorated tissue, and came to the conclusion that it was a case of infectious granuloma. He acted accordingly, left the femur, and saved the patient's leg. No recurrence took place. It was difficult to make a differentiation between infectious granuloma and sarcoma.

Dr. Emerson F. Root, of Salt Lake City, stated that about six or seven years ago he had a case of what he thought was primary sarcoma of the appendix. The patient had had a chronic appendicitis for more than a year. He refused operation, and at this time for a month or two he was rapidly running down, and asked to be operated on. Operation was performed. The appendix was found to be very large, five or six inches long, and an inch or more in diameter, with its lumen almost occluded. It was rather hard and very loosely attached. The cecum was not involved to any great extent. The appendix was removed together with a small portion of the head of the cecum. The wound healed by primary intention. Two or three months later the patient died. In this case the microscopic diagnosis was made of round cell sarcoma of the appendix.

Dr. William Jepson, of Sioux City, Iowa, stated that he was adverse to coining new terms

that did not express anything. The term desmoid tumor arose from the fact that prior to their histological conception of what these tumors were like, they were classed as having developed from hard band-like masses found in the rectus muscle or else in the transverse fascia. The term desmoid meant hard band, and these hard bands were found in the abdominal wall, and it was found tumors developed from them, and consequently they were called desmoids. Was there any reason why they as surgeons should adhere to such a term when these tumors were strictly fibromas? That was all they were.

DR. JONES, in closing, said he regretted he did not bring the sections along with him. He would say, however, that these sections were submitted to four or five pathologists in his neighborhood and all of them pronounced the disease sarcoma.

ACUTE SUPPURATIVE APPENDICITIS

DR. WILLARD BARTLETT, of St. Louis, Missouri, described the operative technique in this condition at which he had arrived after years of simplification.

1. The abdomen was invariably opened through a gridiron incision immediately over the dull area if one could be made out, otherwise at McBurney's point. It was very rarely the case that this incision had to be enlarged, which could be done, though with slightly greater difficulty, than was the case in ordinary through and through openings. His experience had taught him that it was just as applicable to pus work as to any other.

2. Immediate search for the appendix was made, it being his practice always to remove it if it could be found without unnecessary loss of time or disturbance of many adhesions in the presence of a large amount of pus. He did not often go so far as to turn out the head of the cecum in order to find the appendix, but considered this advisable where this carried with it the adherent viscera which completely surrounded a collection of pus, to be opened outside of the abdomen at the removal of the appendix. It was rarely his custom to do much or any so-called walling off with gauze in the search for the appendix. They long ago learned that intra-abdominal tension forced liberated pus toward the opening in the wall rather than in any other direction. On the other hand, undoubted harm was done by gauze packs. At the same time, ready access to the viscera was interfered with. While in clean work he made a peritoneal autoplasty when working on the appendix or any other viscus covered by peritoneum, in these pus cases he simply tied a strand of catgut around the base of it, including the mesenteriolum, and cut it off. Not only did this save time, but the appendix and adjacent cecum were often so indurated and friable that ordinary Lembert stitches would not hold. By way of justifying a search for the appendix in the acute stage, it was hardly necessary to state that a variety of dangerous complications were avoided by its removal. In a very small per cent of these cases a fecal fistula had made its appearance, but not one had failed to close spontaneously in a few days.

3. Drainage was instituted in every case where exudate was met with. This was most readily and accurately accomplished to his thinking by tying at its middle a strip of rubber dam or a ribbon cut from an older rubber glove in the catgut ligature on the base of the appendix mentioned above. This treatment sufficed for ordinary cases, although he was not here dealing with remote pus collections, which were infrequently early in the disease and which must be considered as complications not to be dealt with in any simple routine procedure. Drainage was further aided by placing the patient in bed on the face directly after the operation. In a few days the catgut ligature was absorbed and the drainage came out of its own accord.

4. Suture of the deeper layers of the abdominal wall was never attempted unless the muscle-splitting incision had been considerably enlarged. The drain practically filled the small dead space resulting from the spontaneous closure of such incisions, thus re-establishing intra-abdominal pressure sufficiently for their purpose. In the middle of the skin wound was placed one or two clips at each side of which one-half of the rubber drain emerged, its two ends being fastened together by a clip which prevented the possibility of its being drawn into the abdomen. Thus one had practically coapted the edges of an infected wound without any danger of pus retention in the depths or under the skin. After the two drains had been removed at the end of a week, the resulting defects in the skin were closed with adhesive plaster, and in two weeks after the operation most of these patients were out of bed with a solid abdominal wall and with the skin wound completely healed or almost so.

SURGERY OF THE MEDIASTINUM

DR. B. MERRILL RICKETTS, of Cincinnati, spoke of the progress that had been made in the surgery of this region. The neoplasms now operated on in this region included abscess, dermoids, lipoma, foreign bodies, hæmorrhage, en-

chondroma, hydatids, etc. Strange as it might seem, the two conditions that had been operated on most frequently were abscess and dermoids. In the last ten years numerous devices had been introduced for positive and negative pressure. There had been nothing done with the Sauerbruck apparatus that could not be done without it, so that there were no special advantages attending its use. In his experience he had found that he could expose the tissues of the esophagus, a bronchus, or any portion of the lung, pericardium, or any portion of the mediastinal space without this apparatus. But surgeons now had something at their command which was of special interest and usefulness, namely, the Matas method of inflation. With this means the chest could now be opened and anything done upon the tissues within it by the method that had been suggested.

A NEW PRINCIPLE IN THE ACTION OF ANTISEPTICS

Dr. M. G. Seelig and Dr. C. W. Gould, of St. Louis, Missouri, read a paper on this subject which will appear in a subsequent issue of Surgery, Gynecology and Obstetrics.

DEFINITE KNOWLEDGE OBTAINED BY MEANS OF THE X-RAY

Dr. E. M. Sala, of Rock Island, Illinois, reported twenty-two cases illustrating a variety of conditions in which the X-ray proved very useful and decidedly advantageous. His conclusions were: The X-ray, when in good working order, was one of the most valuable adjuncts to good surgical work they had at their command. It helped to make surgery a more exact science; it gave them a much clearer understanding of their cases, and would eventually lessen to a great extent the vast number of cripples that were unavoidable previous to the time of its use.

DISCUSSION

Dr. Daniel N. Eisendrath, of Chicago, showed a specimen which was obtained at autopsy of the bladder, ureter, and the left kidney with dilated pelvis. In dissecting the specimen several phleboliths were found. These phleboliths lay close to the ureter, entering into the posterior wall of the bladder. He exhibited an X-ray plate showing the progress that had been made in the X-ray diagnosis of ureteral calculi. He emphasized the great value of the X-ray as an aid not only in fractures, but in many other fields of surgery.

Dr. Willard Bartlett, of St. Louis, Msssouri, said in regard to wiring fractures which was touched on in the paper, given cases in which an operation was decided upon, he wanted to speak emphatically in regard to the usefulness of the Lane plate. Since having observed Mr. Lane's work in London about six months ago, he had had occasion to screw on steel plates in from forty to fifty cases, and with the exception of fracture of the patella, of which he had had only one in this series and with the further exception of fracture near the ends of the long bones, he believed that wire had been driven out of business by the Lane plate.

Dr. A. H. Levings, of Milwaukee, Wisconsin, wished to say a few words with reference to the treatment of fractures. He had listened with a good deal of interest to what Dr. Bartlett had said about having put on Lane plates in forty or fifty cases of fractures since he had returned from London six months ago. He had had the pleasure of meeting Mr. Lane in Milwaukee a few weeks ago while on a visit to this country, and discussed with him the question of the universal use of these plates, and he would like to ask Dr. Bartlett whether he did not find it difficult to get patients who would allow him to operate on every case of fracture. He thought any man who had used the Lane plates on forty cases within six months must have operated on every case that had come under his observation. Where fixation was required to immobilize bone fragments that could not be otherwise immobilized, the Lane plates were infinitely better than wire, because most of the members who had examined skiagrams of fractures after they had been wired, especially of the femur, had found in many instances that the wires failed to hold the fragments in approximation, and in some instances the deformity and the displacements of the fragments had been greater after wiring the fragments than before. In regard to spiral fractures of the tibia, they were quite common. For some four or five years he had been treating all these fractures of the lower extremity without wiring, without any mechanical fixation whatever, and he had yet to find a fracture that could not be reduced and held in good approximation without the use of either Lane's plates or wire. With the collaboration of Dr. Mueller, of Chicago, some five years ago he devised an apparatus for the mechanical extension of the leg while a plaster cast for the purpose of immobilization was being put on the leg, and with it he had obtained excellent results.

Dr. Emerson F. Root, of Salt Lake City, stated that if you went before a court of justice, every juror, every person in the court room had an idea of the X-ray picture, and he read it to suit

himself, and this was not at all in accordance with the idea of the man who took the picture. No man was so wise that he could offhand read every X-ray plate or very many X-ray plates without gradually educating himself to do so, and in going before a court he thought the person who had the X-ray plates to explain should insist on having his version of the matter taken by the jury and by the court.

DR. SALA, in closing, stated that he was a firm believer in the use of the Lane plates, but they would not be a good substitute for the wire in the class of cases he had mentioned.

PRIMARY SUTURE OF SUBPARIETAL RUPTURE OF THE KIDNEY

DR. F. GREGORY CONNELL, of Oshkosh, Wisconsin, after reporting an interesting case of simple subparietal rupture of the left kidney in which he resorted to lumbar incision and suture of the kidney 42 hours after the accident, with recovery, drew the following conclusions:

1. Owing to the rapid recent increase in the number of reported cases, there was reason to believe that subparietal rupture of the kidney was more frequent than the literature would lead one to believe.

2. Shock injury to other organs, and external evidence of trauma were frequently absent.

3. History of an abdominal contusion, followed by rigidity and hematuria, was sufficient to lead to exposure of the organ.

4. Slight lesions, and complete rupture of the kidney could not be differentiated by clinical signs or symptoms.

5. Proof of the absence of serious rupture was called for before instituting the so-called expectant treatment.

6. Nephrectomy should be reserved for very extensive disintegration of the organ.

7. Conservative treatment, preferably by suture, was indicated in the majority of cases.

DISCUSSION

DR. WILLIAM J. FRICK, of Kansas City, Missouri, said heavy blows or falls striking on or about the lumbar region should always be regarded as serious. The appearance of hematuria following such injury should be sufficient evidence upon which to make a diagnosis of rupture of the kidney, although the absence of hematuria following such injuries was not always absolute proof that the kidney had not been injured. In one case of subparietal rupture of the kidney, a complicated case, hematuria was very slight, although the damage to the kidney was apparently beyond repair. The patient did not live very long. The wound about the kidney was simply packed. Injuries of the kidney were nearly always followed by hematuria, but this was not invariably the rule. In a case of gunshot wound of the kidney there was not a trace of blood in the urine to be found, macroscopically at least, although the perirenal space was filled with blood. When a diagnosis of rupture of the kidney was made, the kidney should be exposed by a lumbar incision, especially if it be an uncomplicated rupture of the kidney, as it was the only means they had of determining the extent of damage done to the kidney. They could not depend upon the amount of hematuria or any other sign. Knowing the ability of kidney tissue to repair itself, they should attempt conservative surgery in these cases. Nephrectomy should not be done unless the injury to the kidney parenchyma was so extensive as to preclude the possibility of saving enough of it to be of functional value, and unless the injury to the renal vessels was so great as to seriously interfere with the nutrition of the organ.

DR. GEORGE N. KREIDER, of Springfield, Illinois, stated that if he might combine a little remark in regard to Dr. Sala's paper with this one, he would say that with the latest development of the X-ray picture, they could definitely outline the kidney, differentiating the pelvis from the substance of the kidney by the Snook type of X-ray machines. Another valuable item he saw in one case, and which might be of advantage also in connection with the X-ray, and that was, to give the patient methylene blue, which would undoubtedly cause staining of the tissues about the injured kidney, and this with the radiogram might prove of great assistance in the diagnosis of these cases.

DR. B. B. DAVIS, of Omaha, Nebr., thought a great many nephrectomies had been done in the past unnecessarily, and they were beginning to realize the wonderful reparative power the kidney possessed. He had had one case in which he cut off the lower end of the kidney, removing about one-third of the organ, and putting in a mattress suture below, with recovery of the patient. He believed that in many of these cases the suture was very much to be preferred to gauze drainage or gauze used to control hæmorrhage.

DR. F. A. DUNSMOOR, of Minneapolis, stated that there was one point which might be added to those that had been brought out in connection with this paper, and that was this: it was not the mere escape of blood which produced death in

these cases, but it was the mixture of urine with the blood and its absorption into the tissues which caused death, particularly in these complicated cases, in which the abdominal cavity was contaminated.

Dr. Arnold Schwyzer, of St. Paul, stated that as to the diagnosis blood in the urine might be very scant. In one case of injury to the kidney that came under his observation the first urine which was drawn with catheter in the hospital, was not examined, and this was about two hours after the injury. The first urine they got should not only be examined by the eye, but microscopically.

Dr. A. W. Abbott, of Minneapolis, wished to speak of some experiments which were made by a Minneapolis physician, Dr. J. Frank Corbett, for the purpose of determining the ultimate results of injury to the kidney. In the first place, where the kidney had been injured and the capsule only sewed together, if there was much hæmorrhage left in the kidney, it was followed by inflammatory trouble usually, and then by a scar, and a large part of the kidney was rendered useless. The same results followed packing. The best results were obtained by the through and through suture which passed through the kidney directly and about the outer limits of the pyramid. This was followed by less scarring, etc.

Dr. Daniel N. Eisendrath, of Chicago, wanted to endorse the position taken by Dr. Davis in contradistinction to that taken by Dr. Connell and Dr. Frick, and his experience was based on a personal observation of fifteen cases of subparietal rupture of the kidney. The conclusion, from the study of these cases, had been forced more and more upon him that the more conservative they were in the treatment of subparietal rupture of the kidney, the greater would be their percentage of recoveries, and he thought that was the tendency they saw in the foreign literature on this subject. He had seen some extremely severe cases where he thought he would do nephrectomy, but he had watched these patients bleed and bleed, and by simply leaving them alone they had recovered. Why did they recover? Granted that the kidney was extensively impaired, they knew these patients were not good subjects for operation; they were suffering from considerable shock, and the manipulation necessary to find and grasp the bleeding artery, which perhaps had already become partly or completely occluded by blood clot, and then started up hæmorrhage in a fresh field, was attended with more harm than if they let these patients alone. They knew from experimental work on the kidney that if they tied off the renal vessels, and left the kidney in situ, that kidney underwent complete atrophy, and within a period of a few months the kidney would be a mass of cicatricial tissue. That condition undoubtedly took place in a certain proportion of cases where the kidney had been severely injured.

Dr. E. W. Andrews, of Chicago, stated that he had seen a man with a ruptured kidney on whom he had operated and declined to remove the kidney, because he thought he had successfully ligated the bleeding point, three days afterwards get another severe violent hæmorrhage and die within a few minutes. They could not get away altogether from the old teaching that a ruptured kidney was apt to terminate fatally, conservatively treated, that is, nothing being done in the way of interference. He did not think they should stand by and let these patients with ruptured kidney have one hæmorrhage after another without doing something for them; but it did not necessarily follow that nephrectomy was the only operation of choice in these cases, for sometimes, as he had done in the case of injury to the spleen or liver, they could make a closure operation. In addition to ligating the bleeding points they could close the injured kidney with rows of mattress stitches, and if such an operation was done under aseptic conditions, it might give a percentage of successful results which would compare favorably with nephrectomy as a life-saving measure.

Dr. Walter Courtney, of Brainerd, Minnesota, wanted to say a word about differential diagnosis between contusion of the kidney and rupture. He had seen a good many cases of injury of the kidney. If the surgeon would wait a few days, as he might in most cases, provided hæmorrhage was not alarming and secondary anemia had not taken place, a large number of these cases would gradually clear up, and it would be found that the kidney had only been contused.

Dr. James E. Moore, of Minneapolis, stated that it was only in exceptional cases that a nephrectomy was justified for rupture of the kidney. A patient was brought into the University Hospital recently, 13 days after he had been thrown in a runaway accident, and presumably had sustained a ruptured kidney. He was brought to them in a moribund condition with his bladder full of clotted blood. He died. At the post-mortem examination they found that he had sustained a rupture of one of the terminal branches of the renal artery just before it entered the kidney, and the presence of blood in the urine was accounted for by the fact that through pressure

the blood was transmitted along and had broken through into the pelvis of the kidney at a point below and finding its way down the ureter into the bladder.

DR. DONALD MACRAE, of Council Bluffs, Iowa, said it seemed to him it was well to take a middle ground in dealing with injuries of the kidney. If they made a positive diagnosis of post-peritoneal rupture of the kidney or of contusion, the case was not fraught with as much danger as other forms of injury to this organ. But if they found a patient was going to the bad, he thought they should resort to incision, with drainage, or whatever was necessary to be done at the time. It was better, however, not to fuss with the kidney if they could help it.

INTUSSUSCEPTION WITH SPECIAL REFERENCE TO ADULTS

DR. ELLSWORTH ELIOT, of New York City, stated that intussusception in adults was of more importance than previous study would indicate. The causes in children were largely confined to acute intestinal disturbances, while in adults they were more varied. The rarer causes were foreign bodies and parasites, less so ulceration from diarrhœal diseases, tuberculosis, fecal masses, etc. A more common cause was trauma, especially severe muscular effort, Meckel's diverticulum was more common in children. The most frequent cause was a tumor, especially the benign polyp, with constricted base. The clinical course in children was fairly characteristic, while that in adults varied from one most acute to the very chronic. In his paper he tabulated three hundred cases arranged with reference to etiology and the clinical picture. Of the individual symptoms there was a great variety. Constipation was the rule, but normal stool or diarrhœa might occur. Blood or mucus in the stools was less frequent and usually signified a tumor. A tumor varying in size and shape, especially during the attacks of pain, and changing its position along the course of the colon, was characteristic. The tumor appeared first in the right lower quadrant, but should be looked for in the pelvis or in a position covered by the liver or spleen. Distension, general or focal, was variable. The course in the attack was usually very severe, especially in these cases with Meckel's diverticulum. In the protracted cases the natural processes might cause sloughing of the intussusceptum which was passed by rectum. Of these, forty-three cases were collected. Hope for such relief should not encourage conservative measures of treatment, for in usually less than 18 months secondary obstruction occurred. He suggested, therefore, that after the acute symptoms had disappeared lateral anastomosis be done, connecting the bowel above with that below the affected portion. Treatment should in most cases be radical. With conservative measures complete reduction was never certain; recurrence was likely, and the initial manipulation lowered the resistance to subsequent operation. Reduction in the first 24 hours was accomplished by combined expression and contraction in from 10 to 15 minutes, reduction by either alone being dangerous. Recurrence was avoided by anchorage of the cecum to the abdominal wall, by plication of the mesentery, or by longitudinal endoplication of the cecum along the anterior longitudinal muscular band. Gangrenous intussusceptum and intussuscipiens demanded resection followed by anastomosis or temporary enterostomy. A viable sheath might be split along longitudinally and through this the intussusceptum resected. Temporizing measures were enteroanastomosis and artificial anus. The procedure of choice was to gently reduce as far as possible and then resect. Complete reduction followed by resection was employed only where a tumor or the like was concerned.

He reported two cases; one in a male, aged 40. Following a history of severe cramps three months previously there was an acute attack lasting 24 hours with pain, vomiting, abdominal tumor, one normal stool, and blood in the rectum. Examination showed distended loops of the intestine. At operation there was an enteric invagination with a polyp the size of an English walnut near the apex. Recovery after resection. The second case was a female, aged 67, who had epigastric pain four months previous to operation; a clear interval until three weeks, and then a recurrence sustained with a tumor in the region of the transverse colon. A high enema reduced the tumor, but obtained very little feces. There was no obstruction. Operation was delayed because of lack of symptoms and to increase her strength. Operation showed an ileocolic invagination with a polyp at the apex. Recovery took place after partial reduction, followed by resection.

PRESIDENT'S ADDRESS

DR. JOHN P. LORD, of Omaha, Nebraska, greatly deplored the giving of commissions and dividing fees, and said that realizing as he did that the practice of fee division, secret division, joint fees, commissions, graft, and possibly money under false pretenses, was increasing at an alarming rate among the younger element, and

that in many cities and towns it was the usual thing, he undertook to arouse the members from their seeming lethargy. Teachers and hospital surgeons, as a rule, were established in their respective communities, and had not felt the force of this evil to so great a degree as to compel action. Those who followed would feel it keenly. Many young men were wrestling with this moral problem and would yield to the general trend of practice unless some aroused moral force within the profession or the effect of publicity checkmated this menace to professional honor, dignity, common honesty, and decency. He agreed with those who favored publicity as the speediest and most effective remedy. Then, too, they needed some Roosevelts to keep up a rapid fire attack upon this dishonest practice, and they should maintain a professional and public sentiment against any countenance of graft. The practitioners who had for years adhered to an inelastic fee bill found themselves with their financial wings clipped, and unable to rise above the level of customary fees. The specialist was something of a law unto himself and most often got what he asked. These practitioners, therefore, availed themselves of the specialist's faculty of fee getting and asking to add a sum for them, as the people would object to paying them a proper amount.

The medical schools had been remiss in their ethical instruction to students. The subject had been eschewed in some faculties for fear of engendering feeling, developing strife, and endangering the integrity of the organization. The same silence had prevailed in medical societies because it might cost something to speak. Students were now without the close contact that was enjoyed in the days of the preceptors, whereas they now needed more of the moral and ethical side than ever before.

There had already been more harm done than could be overcome for a generation. Delayed action meant more sacrifice. The organized profession should busy itself in reformation and take its stand in the medical colleges, hospitals and societies, and as individuals and organizations educate the public and reform their own members. The most hopeful view might be taken of the result. Any practice which even smacked of graft, or of obtaining money under false pretenses could not endure before a righteous public opinion. Nor would it continue in a profession which had cherished ideals from Hippocrates and the whole line of medical saints, religiously followed by the vast majority during all the ages of the history of medicine.

INTESTINAL OBSTRUCTION DUE TO KINKS AND ADHESIONS OF THE TERMINAL ILEUM

Dr. Charles H. Mayo, of Rochester, Minnesota, read a paper on this subject which will appear in a subsequent issue of Surgery, Gynecology and Obstetrics.

THE SELECTION OF OPERATION FOR INGUINAL HERNIA

Dr. Archibald MacLaren and Dr. Harry P. Ritchie, of St. Paul, Minnesota, gave the abridged records of 105 anæsthesias showing 123 operations in 97 individuals. The greater number had come during the period of active life, and because of the occurrence of new symptoms or the failure of the truss to retain the hernia. No extraordinary measures, such as filigrees, flaps of the recti, were found necessary to obtain satisfactory repair. During the first decade, the operation without the most positive indications was often questioned. It was no odd experience to have the truss obliterate the sac and when recurrence did come it would usually result in a less complicated form of hernia. During the second decade and beyond their advice was positive as the presence of the hernia was then permanent. Two deaths had occurred, both from strangulated hernia. The total number of strangulations was eight; three of these were in the third decade and the remaining five in the sixth and seventh. Of the complications of convalescence, seven cases had notes of wound infection, only one of which was severe. All cases suffering an inflammation to any degree were instructed particularly as to the possibility of recurrence. The appendix had been removed 26 times at the same time as the herniotomy, usually through a buttonhole in the internal oblique muscle. In one case a herniotomy and a cholecystectomy were done at the same time. Eighteen cases were operated upon for a double hernia. They had as easy a convalescence and there was no reason why the side opposite should not be investigated and a hernia in its inception cured. There was a record of six relapses, two of which are in women. The problem of the disposition of the wound ligaments was unimportant in relation to the cure of the hernia. Here the operation should be called a herniotomy and was not to be placed to the credit or discredit of any of the well known methods. Of the 98 operations on men, there was one Halstead with cure, 55 Bassinis with one return, and 42 Fergusons with three returns. Previous to 1905 there were two cases in which from their description the cord was not displaced, but in all others (34 in number) a Bassini was done. One relapse had occurred

and had been re-operated upon, but the remembrance of the technique of the first operation was such that the failure was ascribed to this rather than to the principle. Beginning in February, 1905, they were influenced in the use of the Ferguson operation. This was done as a routine operation 42 times. The three returns had all been repaired, and the conditions found were identical in each case. There was no sign of the old hernia, but a new one had formed at the most dependent part of the canal. The sac came directly through to the inner side of the cord. When the sac was removed, it was easily demonstrated that if the tissues were replaced as before, that this defect would be uncorrected and there seemed to be no reason why the sac would not immediately recur. The only possible procedure was the use of the conjoined tendon and the displacement of the cord, thus performing a Bassini. The per cent of their success as to the displace- or non-displacement was in favor of the former. In view of the formation of an entirely new kind of hernia which came without displacement of the cord, and which they were powerless to prevent, it had swung the pendulum back in favor of the Bassini, and our present feeling was that if there was a recurrence, we would call it an operative fault and do it over again.

TYPHOIDAL CHOLECYSTITIS

Dr. John E. Summers, of Omaha, Nebr., said that much discussion had taken place as to the mode of invasion of the gall-bladder by the typhoid bacilli. According to Chiari, the route of infection was not by ascension from the intestinal tract, but his theory of gall-bladder infection by the typhoid bacillus was, first, the intestine, thence the blood, and then the gall-bladder.

Dr. Summers reported several cases, one of which was a pure case of typhoidal cholecystitis, the gall-bladder involvement giving symptoms at the beginning of the first relapse. The absence of any obtainable history of gall-stones prior to the illness could fairly fix the initiation of the formation of the stone found in the common duct as taking place probably during the first part of the attack. The time from the beginning of the attack to the time of removal of the stone was from April first to August twenty-second, sufficient time for its formation. In so far as he was informed, this was the first case of typhoidal cholecystitis with probable formation of the stone during the attack in which the stone was removed from the common duct. Cultures from the center of the stone were sterile, a finding which did not negative the origin of the stone as due to typhoidal cholecystitis. Cholecystostomy upon typhoid carriers, he thought, should be done whenever there was evidence of any infection in the gall-bladder or ducts. In cases where no signs of inflammation could be found, it might be considered that possibly the nesting place for the bacilli was in the diverticulum and operation not indicated. There was favorable evidence for the carrying out of cholecystostomy in these dangerous persons.

PLICATION OF THE ANTERIOR BROAD LIGAMENT FOR RETRODISPLACEMENTS

Dr. A. W. Abbott, of Minneapolis, said the round ligament was not a natural support of the uterus, while the broad ligament was. Suture of the broad ligament just below the round ligament made an efficient support and conformed to the natural anatomical requirements. The operation was rapidly done. The failures were less than by other methods, and there was less pain after the operation.

LESIONS OF THE HIP-JOINT AND THEIR MANAGEMENT

Dr. John B. Murphy, of Chicago, spoke of the elements in connection with lesions of the hip-joint and of an important principle governing the final results obtained in pathological conditions and in fractures. In his recent work in connection with fractures in attaching the upper end of the femur frequently he found a definite condition occurring, namely, absorption of the neck. No such absorption took place in fractures in any other part of the body. It never occurred when there was a fracture in the upper end of the humerus. This absorption was due, he believed, to the primary condition of the circulation in the neck of the femur. When there was a fracture, a lesion, or disease, the repair of that lesion depended more upon the condition of the circulation in the neighborhood than on any other one thing, taking into account always the regenerative potency of the individual structure. In fractures that occurred close to the head of the femur there was practically no absorption at all; no fatty degeneration, no breaking down, no liquifaction of bone. When a fracture occurred close to the base of the neck and there was attachment to the trochanter, it did not tear off the blood-vessels in the capsule inside. That capsule went down and out and back in again, and the blood-vessels went in a proximal and distal direction, but the bone for a certain distance in a great majority of cases was absorbed. If there was a fracture of the neck of

the femur which did not tear off the blood-vessels, then the portion between the trochanter and the head remained, and it was capable not only of revascularization, but of ossification, regeneration, and of sustaining the neck.

In the management of fractures of the femur, it had been the custom to dress them with a straight external splint. What did this do? It tended to shortening by shortening of the adductors, and shortening of the gluteal group of muscles attached to the trochanter, and not only that, the tendency of the adductors was to draw the limb inward, and there was shortening in that position. What the surgeon wished to do was to reduce to a minimum contraction during the process of absorption of this portion of the head of the femur, so that when absorption had taken place and the tissues were ready for regeneration, it was essential to have the parts in apposition. They could be best maintained in apposition by relaxing the group of muscles which did so much to cause shortening by putting on extension. The ambulatory management of tuberculosis of the head of the femur was wrong, in his opinion. An ambulatory apparatus was applied to prevent motion, and as far as it inhibited motion in a joint it was valuable. But what should it be applied for? To prevent pressure on the inflamed part. When the products of infection were held under tension there was rapid destruction of tissue. This tension should be relieved. The first main principle should be to separate these articular surfaces by an extension apparatus, and then build up the patient to stimulate the process of repair.

Dr. B. B. Davis, of Omaha, Nebraska, read a paper in which he spoke of Meckel's diverticulum as a cause of ileus.

OFFICERS

President, Dr. Amos W. Abbott, Minneapolis, Minnesota; First Vice-President, Dr. A. E. Halstead, Chicago, Illinois; Second Vice-President, Dr. William Frick, of Kansas City, Missouri; Secretary-Treasurer, Dr. Arthur T. Mann, of Minneapolis, Minnesota.

Kansas City, Missouri, was selected as the place for holding the next annual meeting, and time, December 18 and 19, 1911.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. Clarence Webster, M. D.
J. C. Hollister, M. D.
Heliodor Schiller, M. D.
E. C. Dudley, M. D.
Geo. De Tarnowsky, M. D.
Carey Culbertson, M. D.

A Case of Total Absence of the Vagina. Dr. G. Rivas. *Revista de Medicino y Cirujia*, May, 1910.

Dr. Rivas reports a case in a girl of 15 who had been feeling weak and uncomfortable for a year. For six months had had abdominal pain, constantly increasing, especially at monthly intervals; no menstrual flow. Examination showed a clitoris, a urethra so large as to admit the finger into the bladder, and below this a small dimple. Vesical and rectal examination showed the bladder and rectum to be intimately adherent to each other, and a very much thickened cervix distant about 10 cm. from the surface. The fundus reached above the umbilicus. On account of the lack of mucous membrane necessary to make a new vagina and of the close adhesion between bladder and rectum an abdominal hysterectomy was made, the adnexa being removed with the uterus. The tubes were found greatly distended and very thin, and filled with dark blood. The uterus was distended with blood and showed a constriction in the lower third corresponding to the internal os, but there was no external os and no epithelium between the cervix and the skin. Histological examination of sections from the cervix showed normal cervical tissue, but no traces of a vagina were found.

B. J. O'Neill.

Bilateral Dermoid Cysts of the Ovary (Cisti Dermoidi Ovariche Bilaterali, Studio chirico ed Anatomopatologica). Dr. Alexandro Vaccari. *Folia Gynecologica*, vol. iii, 1910.

Throughout international medical literature, Vaccari collected 132 cases from 1875 to 1910. Two of these cases were operated on in Professor Vicarelli's clinic in Pavia. Reviewing 208 reported cases of dermoid cysts of the ovary, he finds both ovaries involved in 14 per cent of all cases. They occur most frequently between the ages of twenty and fifty years. The early menstrual history of these cases is negative as regards dysmenorrhœa. In the majority of cases reported, there is however a distinct history of leucorrhœa, dysmenorrhœa, irregular menstruations, and changes in duration and quantity of menstrual flow. Metrorrhagia is occasionally noted. In 80 per cent of all cases the cysts are markedly unequal as to size.

The train of symptoms produced by these dermoid cysts are due to : (1) Compression; (2) adhesions; (3) ascites (rare); (4) torsion of the pedicle (14 per cent); (5) suppuration; (6) carcinomatous degeneration.

Clinical diagnosis. A study of all reported cases reveals the fact that an accurate preoperative diagnosis was only possible in two cases. In the vast majority of cases, a diagnosis of cystic ovaries, double salpingitis, or multiple uterine fibroids was made prior to the laparotomy. The clinical symptoms and findings are those of ovarian cysts in general. It is seldom possible to diagnose the bilateral presence of dermoid cysts of the ovary. The larger cyst may hide the smaller one, or pregnancy may still further cloud the picture.

Two cases are reported in which the radiograph revealed the dermoid nature of the cysts.

The prognosis should always be guarded inasmuch as dermoid cysts are subject to a great variety of complications and are always in danger of malignant degeneration.

Treatment. The vast majority of gynecologists now prefer the abdominal route. In all cases an attempt should be made to preserve some ovarian tissue.

A comprehensive review of the various theories advanced as possible explanations of the genesis of these tumors only reveals the fact that each investigator has his own particular idea and that they are all searching for demonstrable facts. Ectodermic invagination, parthenogenesis, rudimentary embryonal formations, wandering blastomeres, etc., all have their adherents.

CONCLUSIONS

1. The existence of bilateral dermoid cysts of the ovaries is not rare.

2. They cause relatively few menstrual disturbances; there is rarely premature amenorrhœa or a typical metrorrhagia after the menopause.

3. Sterility is infrequent and conception can take place.

4. All complications which are common to cysts in general such as twisting of pedicle, adhesions, suppurations, etc., as well as painful symptoms, are more marked in bilateral dermoids than in single dermoids.

5. Even in double dermoid cysts, ascites is rare.

6. The diagnosis of bilaterality although difficult, is not impossible. Dermoid cysts simulate salpingitis, ovario-salpingitis, or multiple fibroids of the uterus.

7. The possibility of finding throughout the ab-

dominal cavity dermoid cysts of various sizes, and having the type and shape of metastases, gives rise to the suggestion that dermoids may not be benign tumors.

8. Carcinomatous degeneration is rare in bilateral dermoid cysts, and very exceptionally involves both tumors.

9. Treatment consists either in resection of the dermoids or in hysterectomy.

10. In every operation for dermoid cysts of one ovary the opposite ovary should be closely examined before closing up the abdomen.

11. The blastomeric theory of Bonnet appears to be the most satisfactory. GEORGE DE TARNOWSKY.

Two Cases of Torsion of the Uterus (Zwei Falle von Achsendrehung des Uterus). J. OLOW. *Monats. f. Geb. u. Gyn.*, b. xxxi, h. 1.

A woman of twenty, pregnant in the 9th month, fell suddenly sick with severe pain in the abdomen after hanging up the wash. The pain increased rapidly and she died the next day. At the postmortem all organs were found normal with the exception of the pregnant uterus which was torqueted in the cervix about 180°, so much that the left ovary was in the right side and vice versa. The veins of the uterus were much congested, there being a great blood clot between the membranes and the cervix on the place of the torsion anæmic.

A woman of 54 years came to the clinic and a large intra-abdominal tumor was found. In the evening before the day set for the operation she suddenly experienced severe pain in the abdomen, collapsed and died several days later without being operated upon. The postmortem showed an enormous, enlarged uterus through myomata, the whole tumor torqueted 360°; also symptoms of a beginning peritonitis.

In the literature are 60 cases of torsion of the uterus reported. The ages of the patients range from 30 to 60 years. As a predisposing factor, pregnancy through the mechanical distension of the abdomen and the softening of the tissues, is named. But there are nearly as many cases reported without pregnancy, also cases with firm abdominal walls showing that these are not the only etiologic factors. As immediate causes are named injury to the abdomen, lifting and bending. Nearly all cases show a tumor either of the uterus or ovary. The degree of the torsion varied from 45° to 360°. The place of torsion is on the border line between cervix and uterus. The uterus shows congestion, hæmorrhages, edema and partial necrosis. There is usually ascites and symptoms of peritonitis. In some cases the bladder was included.

Symptoms: Acute onset, followed by peritonitic symptoms. In a few cases the symptoms are more subacute, others have metrorrhagias or severe tenesmus, but altogether there are no characteristic symptoms and the best that can be diagnosed is torsion of a tumor. Only where the torsion is 45° could it be palpated.

Treatment: Operation.

The first case described is interesting through the absence of a tumor and the presence of a firm and strong abdominal wall. The normal dextrotorsion of the uterus could not come in question.

HELIODOR SCHILLER.

Vaginal Secretion in Infants. G. D. ROBINSON. *Proc. Roy. Soc. Med.*, 1910, iv.

Robinson examined the vaginal secretion of 50 newborn infants and came to the following conclusions:

1. The vaginal secretion is sterile during the first forty-eight hours of life, and in the majority of cases (if not in all) for a much longer period.

2. The reaction of the vaginal secretion is "acid" in the great majority of cases, from the time of birth onwards, and that this "acidity" is a normal quality of the secretion and is not due to the action of micro-organisms.

In those cases in which the secretion is alkaline he thinks the alkalinity is most likely due to excess of cervical secretion. C. G. GRULEE.

Special Reaction of Uterine Mucosa Following Trauma (Artificial Placentation of Loeb) (Su una Forma Particolare di Reazione della Mucosa Uterina in Seguito ad Alcuni Traumi.) DR. ANTONIO GASBARRINI. *Bolletino della Societa Medico Chirurgica di Pavia*, iii, 1910.

Experiments were carried out on guinea pigs and rats. The precise date of ovulation was ascertained not only from the macroscopic appearance of the vagina, but by observing the date of coitus, which is believed by many observers to provoke rupture of the follicles.

Each animal was laparotomized, and short deep incisions were made in the uterine cornua. In some cases foreign substances were introduced in the cornual incisions. The uterus was then replaced and the abdominal incision closed. The animals were killed from 10 to 12 days later, and sections of the uterine mucosa examined.

Conclusions: Incisions or punctures through the uterine cornua of guinea pigs made 2 to 9 days after ovulation transform the uterine mucosa into a structure resembling the decidua of pregnancy (placentale materno). This reaction of the mucosa appears as early as the tenth day after operation, either at the site of the incision or at some distance from it.

2. Traumatisms of the uterus, in cases where ovulation had not taken place a few days previously, do not produce decidual tissue.

3. The same negative condition exists either when the ovaries are removed shortly before making the cornual incisions, or after injecting in ovariectomized animals fresh ovarian substance.

4. In the formation of an artificial decidua, it is evident that the ovaries furnish an active principle, of unknown nature, which, through some special mechanism and in definite periods of the sexual life of animals, prepares the uterus for the development of the decidua. GEORGE DE TARNOWKSY.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D. — Herbert Marion Stowe, M. D.
Heliodor Schiller, M. D. — C. G. Grulee, M. D.

CÆSAREAN SECTION

(Symposium at the last International Congress for Obstetrics and Gynecology, at St. Petersburg, September 22 to 27, 1910.)

BUMM

Bumm defines Cæsarean section as an artificial delivery through the abdominal wall, thereby excluding the so-called vaginal Cæsarean section of Dührssen. The classical operation has undergone no modifications since the time of Sanger. Frank's new operation, modified by Sellheim, Veit, Latzko, and others comes into competition at the present time. The advantages of Sanger's operation are that it can be done during the last weeks of pregnancy and the first stages of labor and the technique is comparatively easy. The technique of the suprasymphyseal operation is not so easy and in many cases is quite difficult. Especial difficulty may arise in separating the plica in the vesicouterine space and in preventing rupture of the peritoneum. The modifications of Latzko and Döderlein have simplified the operation somewhat but not to any great extent. Solm's method is tedious and not without danger. A further difficulty lies in the extraction of the fœtus and this may account for the greater fœtal mortality than that which follows the classical procedure. On the other hand, many cases are really treated extraperitoneally; in others the perforations can be closed by suturing or clamps and infection of the abdominal cavity by the liquor amnii avoided to a great extent. The hæmorrhage during operation is less and suturing of the anterior cervical wall is simpler. Bumm's experience in infected cases is not good when the extraperitoneal Cæsarean section is performed. In 33 cases, he lost three mothers. All the children recovered.

As to the indications in clean and favorable cases, good results are obtained by both methods. The classical operation would be preferred if the fœtus were weakly and demanded an immediate delivery. The more tedious and difficult technique of the later operation might prove disastrous to the child. If infection is present, both forms of Cæsarean section are dangerous. Here hebosteotomy should be considered if the pelvic contraction is not too severe, otherwise perforation of the living child is in order. Those whose conscience will not permit craniotomy on the living fœtus will sacrifice an extra five to ten per cent of the mothers. In the presence of virulent bacteria, every form of Cæsarean section is dangerous, the classical operation from peritonitis and the suprasymphyseal Cæsarean section from abscess of the pelvic connective tissues and septic thrombophlebitis.

PESTALOZZI

In absolute pelvic contraction, abdominal Cæsarean section is our only hope. The operator should not wait until the cervix is dilated but operate upon the aseptic woman early in labor. When the liquor amnii has escaped, the cervix dilated, the asepsis questionable, the extraperitoneal Cæsarean section is indicated when the patient has been under our care from the first — the CV being 7.5 cm. or more — or when she is seen at this stage for the first time. If a well defined sepsis is present, no Cæsarean section is permitted. If the pelvis permits, one may save the mother by embryotomy. In a CV of under 5 cm., embryotomy being impossible, the Porro operation is chosen. Pestalozzi advocates the uteroabdominal fistula, as advocated by Lestocquoy and Sellheim, as one method of lessening the danger of sepsis. The maternal mortality after the typical Porro operation is still too high.

The author places his patient in the Trendelenburg position, draws the fundus out of the abdominal cavity, and incises the fundus after the method of Fritsch. He prefers the Latzko - Döderlein technique in the performance of the extraperitoneal operation. This latter operation he has performed nine times with excellent results. The classical method is preferred in placenta prævia or rigidity of the cervix. In eclampsia, Cæsarean section is too dangerous. With an accommodating pelvis, intrapelvic delivery is better.

A repetition of the classical operation offers no danger to the mother when the case is aseptic and the fundal incision is made. Pestalozzi has performed 38 secondary sections with only one death. He is against sterilization in general, as a woman can have several children by this method of delivery. If the patient desires sterilization, a resection of

both tubes is the preferred method. The Porro operation is selected in septic cases, in the presence of uterine or periuterine tumors, in cervical carcinoma, accidental hæmorrhage, stenosis of the vagina, and osteomalacia.

ROUTH

The induction of premature labor as a treatment of deformed pelves is, on account of its low maternal mortality (0.5 per cent) and the favorable prognosis for the fœtus after the 35th week, a favored method of delivery in England. Hebosteotomy is declined by the majority of British operators because of the high morbidity percentage. The only indication exists when labor has progressed for a time, the head being fixed in the inlet, a forceps delivery being impossible, the disproportion between the head and pelvis not being marked, the case aseptic, and the surroundings favorable. The British prefer the induction of labor, Cæsarean section, and craniotomy in the treatment of pelvic contraction.

The absolute indication for Cæsarean section obtains when the CV is under 6.2 cm. and no infection exists. The commonly accepted technique is followed. Artificial sterilization is only reluctantly done because a second Cæsarean section is not more dangerous than the first. A few operators only sterilize after each section; others, only at the desire of husband and wife. The method consists in the excision of a piece of each tube and then burying it subperitoneally or the exsection of a portion of each tube between two ligatures.

The extraperitoneal Cæsarean section has few British supporters. In septic cases, they prefer craniotomy, or the Porro. The latter operation is often done by English specialists in infection during prolonged labor. If the fœtus is alive, this operation is preferred to all other forms of abdominal delivery. If the fœtus is dead and the CV is above 6.2 cm., craniotomy is selected.

The vaginal Cæsarean section is not practised in England. Only in rare cases of eclampsia is it done when delivery is not possible by other intrapelvic methods. Nearly all operators prefer the abdominal Cæsarean section because it requires less time and further because the incision is made in healthy tissues, thereby allowing healing by primary union. The rigid or malignant cervix is avoided. A still further reason is that the postoperative morbidity is less than in the vaginal Cæsarean section. Fifteen obstetricians have performed vaginal Cæsarean section 32 times and lost 14 mothers (43.7 per cent). The indications were eclampsia, cervical carcinoma, accidental hæmorrhage, placenta prævia, cardiac disease, and hyperemesis. If in placenta prævia, the cervix is too rigid and unyielding to perform Braxton-Hick's bipolar version, if the fœtus is living and is viable and the mother not too much exhausted, abdominal Cæsarean section is done but never the vaginal method.

In eclampsia, the uterus is emptied. The treatment of eclampsia by Cæsarean section "after the first convulsion" (Bumm and Dührssen) is declined on the ground that 75 per cent of such cases recover without operation. Only when the condition of the mother suddenly becomes grave and when the fœtus because of cervical rigidity cannot be delivered otherwise, is Cæsarean section called for.

Of the 1,006 cases of Cæsarean section performed in England by living obstetricians and gynecologists, 982 were done since 1890. The mortality was 9.8 per cent. The present mortality of the favorable cases in contracted pelvis is three per cent. The total maternal mortality during the last decennium is estimated at 8.3 per cent.

E. P. DAVIS

Of 77 Cæsarean sections which Davis has done, the majority were for deformed pelvis. Only six were performed for other reasons, two for placenta prævia and one for uterine inactivity associated with multiple fibromata. Good results are obtained by operating before labor sets in if the condition of the mother calls for rapid delivery at that time. In the early operation, atony uteri is not to be feared.

DÖDERLEIN

The number of possible operations renders a correct decision as to the proper method of procedure in the individual case more difficult. We should incline more toward a tendency of watchful expectancy — in vogue for the past century — and operate more sparingly. In case, however, operation is indicated, that method is preferable which insures the welfare of both mother and child. In a CV of 7.5 to 8 cm. and above, a spontaneous delivery should be awaited unless interference is demanded on the part of the fœtus. Perforation and embryotomy under difficult conditions, even in private practice, still have a field because of the exceeding low maternal mortality. In hospital practice, the doubtful cases are to be treated by the classical section or hebosteotomy. At other times, the extraperitoneal Cæsarean section, after the method of Latzko and Döderlein, is to be done. Döderlein reports 25 cases of Cæsarean section with a loss of three mothers and three children; one mother dying from eclampsia. The delivery of the child in the extraperitoneal method is more difficult but the subsequent suturing is easier. Döderlein always drains after extraperitoneal Cæsarean section. If the mortality after the extraperitoneal operation is higher then after the classical method, it is due to the more unfavorable cases in which the newer treatment is tried. Collected statistics are of little value as the cases differ so much and the skill and experience of many operators have a decided influence in the result. Of importance only are the results of an operator with a large experience in this class of cases.

Döderlein also reports 50 cases of hebosteotomy. One woman died from ileus and at the autopsy it was found that none of the organs were injured. Hebosteotomy is easier technically than any of the

methods of Cæsarean section. Healing is rapid when the operation is done subcutaneously. Convalescence is also rapid so that in 13 or 14 days the patient can begin to walk. After three weeks, she can go home, long before the callus is firmly organized. Döderlein does not wait for spontaneous delivery after hebosteotomy, but delivers the child by forceps or version and extraction. In two cases where he awaited spontaneous delivery, both children were born dead.

OPITZ

Opitz reported 13 cases of Cæsarean section which he had performed by various methods. In six cases, he operated according to the following technique: After opening the abdomen, he protected the abdominal wall with towels. Trendelenburg position. The peritoneum was incised transversely above the bladder. This organ was then separated from the uterus and a longitudinal incision made through the anterior cervical wall and a portion of the fundus when necessary. The fœtus was delivered by forceps, version, or with the assistance of the hand in the vagina. The placenta was removed manually if it did not separate spontaneously. The uterine incision was then sutured and the peritoneum closed by continuous catgut. The omentum was placed over the line of incision to reduce the possibility of adhesions and the abdomen closed. If the case was suspicious, a strip of gauze was placed in the area between the bladder and cervix and drainage into the vagina secured. All the women recovered except one who suffered from a cervical carcinoma. One child was lost in a case of moderate pelvic contraction (CV 8.2 cm.). A too protracted labor was permitted resulting in the child's death from asphyxia. The remaining 12 patients were treated with satisfactory results.

The classical Cæsarean section in rightly selected cases gives good results, but one frequently sees cases where with or without internal examinations the fundus uteri is infected with virulent streptoccoci. If the uterine body is intact, no general infection may arise, but if the endometrium is injured, a fatal peritonitis may develop. If the operator is sure of his patient, the classical operation is also the simplest, but he is never positively sure, he can be only relatively sure. This is shown in cases where typical favorable conditions are supposed to be present, and yet the woman dies from a virulent sepsis. If the incision is in the cervix, extension of the infection is more difficult. The cervix is more resistant against infection than is the corpus. The wounds lie deeper in the pelvis and can be more easily limited. The purely extraperitoneal section is tedious and unnecessary, also more dangerous, as the operation opens up the pelvic connective tissues freely and invites an extensive infection.

SELLHEIM

Sellheim has performed 46 Cæsarean sections according to the various methods. Five mothers and six children died. The extraperitoneal Cæsarean section is to be preferred to the vaginal section and can be repeated upon the same person several times. In infected cases, the extraperitoneal operation is dangerous. By preventing infection during delivery, this technique offers a relatively safe method of rescuing the fœtus. Sellheim's technique, which was demonstrated by drawings, offers a typical and not too difficult operation. The difficulty of extracting the fœtus is lessened by the Trendelenburg position and by passing the hand into the vagina and pushing the head into the incision. Infected cases are treated by establishing a uteroabdominal fistula in which case the uterus should be sutured to the abdominal wall before making the incision. Sellheim prefers the Pfannenstiel incision as it permits more room for the operation, offers less chance for ventral hernia, and in septic cases affords more chances for healing.

HERBERT M. STOWE.

Studies of the Uterine Myoma in Its Relation to Conception, Pregnancy, Birth and Parturition (Studien über Uterusmyoma in seinen Beziehungen zur Konzeption, Schwangerschaft, Geburt und Wochenbett). ABRAHAM TROELL. *Nord. Med. Arhiv.*, 1909, Afd. I (Kirurgi), Heft 4, No. 7, 1910, Afd. I, Heft 1 and 2.

After careful study of the statistics of his cases, Troell comes to the following conclusions:

1. Most myoma patients are sterile.

2. Among married myoma patients sterility is present to much greater extent and fertility is distinctly lower than among other women of the same age.

3. Among unmarried myoma patients there are sterile women in proportionately greater number, a not unmarked greater number than among other women.

He believes that the development of myoma predisposes in a high degree to sterility. He shows that sterility was much more prevalent among these cases than among other gynecologic cases in his clinic.

The article contains an exhaustive discussion of the etiology of myoma and is followed by a report of numerous cases.

C. G. GRULEE.

Tetany of the Pregnant (Zur Lehre der Tetanie gravidarum). E. FRANK. *Monatsch. f. Geburt. und Gyn.*, xxxii, h. 4.

Tetany of the pregnant is not as rare a disease as it is generally thought to be. Nevertheless very little can be read about it in obstetrical handbooks. Since 1905 the author observed six cases, besides six more in the obstetrical dispensary. During the same period there were eight cases of cataract tetany following tetany in pregnancy, which were treated in the eye clinic of the same hospital.

1. Woman 31 years, vii para, eight months. During the last three pregnancies cramps in the arms and hands. After three months, cramps in both hands; always healthy before. Both arms, the

face, and lower extremities showed typical spasms, Trousseau's, Chvostek's, and Erb's phenomena present. Rest and morphine for the pain brought improvement. Six days after delivery the patient died in one of the spastic attacks.

2. 32 years old, iv para, eight months pregnant. Showed typical attacks, Chvostek's phenomenon. The patient left improved.

3. 37 years old, xiv para, eight months. Had cramps during the last pregnancies in the extremities. Had typical spasms. Erb's, Chvostek's, Trousseau's phenomena. Four days after delivery, normal.

4. 46 years, iii para. In labor transferred from the eye clinic where she was operated upon for cataract tetany.

5. 39 years old, xvi para, eight months, typical attacks, at the same time rapid diminution of vision and severe pain. Both conditions compelled the author to induce labor. Eight days afterward, recovery.

Tetany of the pregnant shows a tendency to recur in successive pregnancies. It affects mostly multiparæ and appears in the latter half of pregnancy, the symptoms increasing in severity with every subsequent pregnancy. Between pregnancies the women are free from the symptoms.

The prognosis in general is good, but cases of death are on record.

The treatment consists of rest and bromids in light cases. For severer cases induction of labor will become necessary. Further conception should be prevented.

The author advances two theories as an explanation of tetany of the pregnant. The pregnant woman has either a priori small or pathologic parathyroid gland respective epithelial bodies. These bodies are able under normal conditions to neutralize the toxins but become inefficient during pregnancy. This theory is supported by the fact that tetany of the pregnant is most observed in places where tetany in general prevails, as idiopathic tetany. Or secondly, we would have to suppose, that in some women the production of toxins during pregnancy is much increased, the normal epithelial bodies being unable to neutralize them, and tetany results. HELIODOR SCHILLER.

The Treatment of Postpartum Hæmorrhage

(Beiträge zur Therapie des Nachgeburtsblutungen). FRANZ WEBER. *Münchener medizinische Wochenschrift*, bd. 57, h. 20.

Excluding the milder cases of uterine hæmorrhage that are successfully treated by massage and hot intrauterine douches, two effectual methods of hemostasis are recognized at the present time.

The first consists of Duhrssen's uterovaginal tamponade of sterile iodoform gauze. The other methods of hemostasis consisting of bimanual compression of the uterus, stretching the uterine arteries to impede the circulation, massage with one hand in the uterus, Breisky's maneuver, etc., are usually unsuccessful if fundal massage and hot douches fail to cause retraction. The Duhrssen tamponade is effective in the great majority of cases if properly introduced. It is allowed to remain in situ for six hours and when removed, the uterus will be found retracted and the bleeding arrested. According to Burckhard, the action of the tampon is three fold; first, it acts as a foreign body by producing irritation and the uterus attempts to expel it by contractions; secondly, the gauze compresses the open and bleeding lumina by direct mechanical means, and lastly, the fluid blood in the gauze coagulates more quickly and thrombosis of the sinuses in the placental site is favored. Despite the assertions of Ahfeld and Veit as to the non-efficiency and danger of sepsis, the general consensus of opinion is favorable to the tamponade. One point is important in making deductions from the statistics. In many instances of death following tamponade in postpartum hæmorrhage, the tampon has satisfactorily arrested the bleeding but the mother died from the previous loss of blood, and these cases should not be attributed to the non-efficiency of this method of treatment.

Since Momberg reported his success with arresting hæmorrhage in the lower portion of the body by a constricting tube over the aorta, the application of this technique in uterine atony has met with fair success by many operators. Weber advises to use a red rubber tubing five feet long and three-fourths of an inch in diameter. The tube is passed from two to four times around the body at the level of the umbilicus and the parts constricted until the femorals cease to pulsate. In certain cases, the authors reported that they were unable to arrest the femoral pulsation. This condition is probably due to the cord not being drawn sufficiently tight rather than being too tight. The findings at autopsy and experiments upon the lower animals have demonstrated that this constriction produces no harmful effects upon the abdominal organs or lower limbs. The pulse, respiration, and the natural functions were not interfered with.

In 11 cases of uterine atony before and 32 cases after placental expulsion treated at Döderlein's clinic, the results were extremely satisfactory. The clinical picture consisted of a relaxed uterus which did not react to vigorous massage and profuse bleeding. After the tubing was applied, the hæmorrhage ceased and the uterus retracted immediately and firmly. In five cases, the treatment failed to stop the bleeding. According to Rieländer, this is due to a full stomach or colon. Sufficient time may elapse between the beginning and termination of labor for the gastric contents to pass into the colon when the large bowel has been previously relieved of its contents by enemata. In case the bleeding is not arrested after the tubing is applied, the uterovaginal tamponade is to be inserted and effectual hemostasis secured.

Weber claims that past experience in Momberg's treatment in many clinics and by different operators is so favorable that it is to be regarded as a dependable and necessary treatment in serious cases of uterine atony and as such is to be recommended to the general practitioner. HERBERT M. STOWE.

BOOK REVIEWS

AN ANATOMICAL AND SURGICAL STUDY OF FRACTURES OF THE LOWER END OF THE HUMERUS. By Astley Paston Cooper Ashhurst, A. B., M. D. The Samuel D. Gross Prize Essay of The Philadelphia Academy of Surgery, 1910. Philadelphia and New York: Lea & Febiger, 1910.

Of all the numerous additions to the literature on fractures which have appeared in recent times, this monograph on fractures of the elbow can deservedly be called a prize essay. A more complete, lucid, yet terse description of the anatomy and surgery of fractures involving this important joint has not been written. The work opens with an anatomical description of the elbow joint and the mechanics of motion. The development of the lower epiphysis of the humerus is traced from infancy, because knowledge of the size and location of the osseous foci about the elbow is absolutely essential to the proper interpretation of a skiagram. Next follows a chapter on classification of elbow fractures with a tabulation of the relative frequency of the various types.

The general mechanism by which fractures of the lower end of the humerus are produced is described and the different varieties of fracture are then taken up in detail. After reduction, the author advocates dressing the elbow in hyperflexion, and the results which Dr. Ashhurst has obtained in forty-seven cases confirm the superiority of this mode of treatment. There are many photographs, diagrams, and radiograms illustrating the text, and the work concludes with clinical histories of the author's cases. This monograph can be recommended as the most complete and best written essay on the subject, and there is a feeling of regret that we have not the whole field of fractures equally well covered.

WILLIAM HESSERT.

AN INTRODUCTION TO SURGERY. By Rutherford Morison, M. A., M. B., F. R. C. S. Bristol, England: John Wright & Sons, Limited.

In this volume the author carries out his view that a course of lectures comprising the principles of diagnosis and treatment based upon a sound knowledge of pathology would be of more service to the student than systematic lectures upon surgery, thereby pointing the way and teaching the student to think out for himself the various problems which are fully dealt with in the text-book of the day.

To this end he has abstracted his own lectures, emphasizing the importance of general principles underlying the diagnosis and practice of surgery.

The first chapter treats of inflammation, its signs, results, and terminations, giving specific examples of the process as occurring in various tissues, finally considering suppuration.

The chapter on bacteria brings out the salient points of general bacteriology, taking up leucocytosis and the defenses of the body against micro-organisms, exploiting antitoxins, vaccines, agglutination. phagocytosis, and opsonic index, with numerous fever charts from cases of sepsis from known bacteria.

Considerable space is given to ulcers and gangrene, with numerous cuts showing the mode of formation and character of the various varieties.

Of particular interest is the portion devoted to syphilis, tubercle and malignant growths.

The part given to the consideration of the hollow viscera is profusely illustrated showing the mechanical action of changes of position, foreign bodies, and new growths, with explanations of the symptoms produced by them.

Lastly under "Indications for Operations" are treated in general three principal reasons offered in favor of operation, viz: (1) To arrest hæmorrhage, (2) To prevent sepsis, (3) To remove a focus of disease.

H. A. POTTS.

BOOKS RECEIVED

BISMUTH PASTE IN CHRONIC SUPPURATIONS. By Emil G. Beck, M. D. St. Louis: C. V. Mosby Co., 1910.

THE DISEASES OF CHINA. By W. Hamilton Jefferys and James L. Maxwell. Philadelphia: P. Blakiston's Son & Co., 1910.

DISEASES OF THE ANUS, RECTUM AND SIGMOID. By Samuel T. Earle, M. D. Philadelphia and London: J. B. Lippincott Company, 1911.

PRIMER OF HYGIENE. By John W. Ritchie and Joseph S. Caldwell. Yonkers-on-Hudson, N. Y.: World Book Company, 1910.

TRANSACTIONS OF THE CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS. Published by the Congress.

Plate. Specimen, showing partial obliteration of the distal portion with dilatation of the rest of the appendix to within one centimeter of the cecum, at which point there is complete obstruction. The orange-colored area in the obliterated portion is carcinoma.